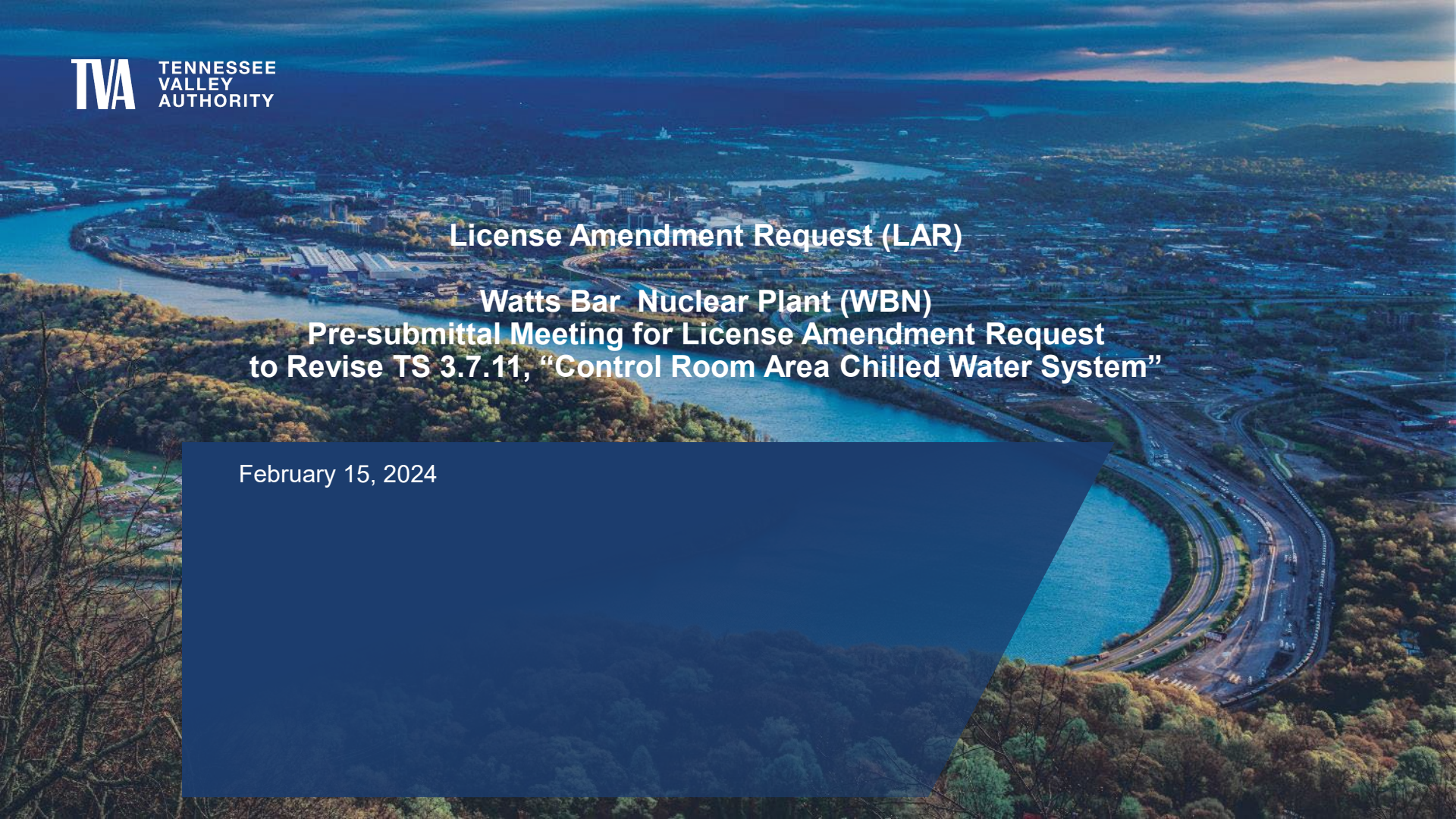

TENNESSEE VALLEY AUTHORITY

License Amendment Request (LAR)

Watts Bar Nuclear Plant (WBN)
Pre-submittal Meeting for License Amendment Request to Revise TS 3.7.11, "Control Room Area Chilled Water System"

February 15, 2024

Agenda

- Introduction
- Background
- System Description
- Description of the Proposed Change
- Reason for the Proposed Change
- Basis for the 96-hour Completion Time
- Technical Evaluation
- Precedent
- Schedule Milestones
- Closing Remarks

Introduction

- The purpose of this meeting is to discuss a proposed license amendment request (LAR) for the Watts Bar Nuclear Plant (WBN) Units 1 and 2.
- The proposed change revises WBN Units 1 and 2 Technical Specification (TS) 3.7.11 "Control Room Emergency Air Temperature Control System (CREATCS)," to modify the TS Actions for two inoperable CREATCS trains.
- The proposed change provides 96 hours to restore one CREATCS train to operable status provided mitigating actions are initiated immediately. The mitigation actions include verifying control room temperature is less than or equal to 90°F and the current installation of a non-safety related chiller with a dedicated diesel generator to provide power to the non-safety related system.

Background

- 5/19/2020 - TVA submits a LAR (ML20140A342) for WBN Units 1 and 2 to add a one-time change of a footnote to the Completion Time for TS 3.7.11 Required Action A.1 to allow one CREATCS train to be inoperable for up to 60 days while performing modifications to the WBN Units 1 and 2 Main Control Room (MCR) CREATCS chillers. The proposed amendment also added a one-time change of a footnote to the Completion Time for Required Action E.1 to allow delayed entry into TS Limiting Condition for Operation (LCO) 3.0.3 for up to 4 days (96 hours) in the event that both CREATCS trains are inoperable during the modifications to the CREATCS chillers. LAR included technical information on the MCR CREATCS replacement project including the temporary chilled water system to be utilized during the MCR CREATCS replacement project.
- 12/16/2020 – TVA responds to NRC RAI (ML20351A424)
- 9/2/2020-10/1/2020 – NRC conducts an audit of the LAR (ML21012A084)
- 5/5/2021 – NRC approves the LAR (ML21078A484)

Background (cont'd)

- 2/37/2023 - TVA submits an expedited LAR (ML23058A447) to revise the timeframe of the above footnotes to begin no earlier than July 1, 2023, and end no later than December 31, 2024.
- 6/7/2023 – NRC approves the expedited LAR (ML23122A232)
- However, installation of the MCR chillers is on hold as a result of operational issues identified on the similarly designed Shutdown Board Room (SDBR) chiller during post installation testing. TVA is currently working with the vendor to develop corrective actions to ensure reliable operation of these chillers once permanently installed in the plant.

Background (cont'd)

- As described in the original LAR, the RAI response, the NRC regulatory audit and the original NRC safety evaluation (SE), a non-safety related chiller has been installed and is being used to support MCR cooling during the CREATCS chiller replacements. This system is capable of providing adequate cooling to maintain the MCR within its normal temperature band. TVA plans to keep a non-safety related chiller available for use to provide backup cooling in the event one or both CREATCS become inoperable.

System Description

- The CREATCS provides temperature control for the control room following isolation of the control room. The CREATCS consists of two independent and redundant trains that provide cooling of recirculated control room air.
- Each train consists of an air handling unit (AHU), water chiller, chilled water pump, and associated piping, ductwork, instrumentation, and controls to provide for control room temperature control.
- The CREATCS is a subsystem providing air temperature control for the control room.
- Further description of the CREATCS is provided in Section 3.1 to the initial LAR (ML20140A342).

System Description

- A description of the non-safety related chiller is provided in Section 3.2 to the initial LAR, the TVA response to EMIB-RAI-1, the initial NRC SE, and the NRC regulatory audit summary. The major components of the non-safety related chiller include the following:
  - Air cooled chilled water package
  - Chilled water pump
  - Power supply, cables, and connections
  - Chilled water supply and return hoses
  - Demineralized water source
  - Engineered penetrations with isolation valves
  - Backup diesel generator (DG) with fuel tank

System Description (cont'd)

- The non-safety related chiller was initially planned to be a temporary system during the MCR CREATCS chiller project. However, TVA has decided to retain the non-safety related chiller. Therefore, the hoses, pipe, and fittings for the non-safety related chiller will remain available. The component ratings for these connections bound the maximum system pressure of the non-safety related chiller. Also, the non-safety related chiller is not a high energy line system, and evaluation and qualification of the system piping for pipe rupture and pipe whip is not required.
- The non-safety related chiller piping system has been evaluated for internal pressure, deadweight, and seismic loading conditions, and meets the requirements of Seismic Category I(L), which is defined in Watts Bar Updated Final Safety Analysis Report (UFSAR) Section 3.2.1.

System Description (cont'd)

- The initial NRC SE also describes how the piping and support including the weld as well as the valve were seismically analyzed. Also, as noted in the initial NRC SE, the flooding effect of potential pipe leakage from the non-safety related chiller water system in the Main Control Room Habitability Zone (MCRHZ) is bounded by the current flooding analysis.
- As noted in the initial NRC SE, the non-safety related chiller working in conjunction with each air handling unit (AHU) is capable of meeting the cooling requirements of the MCRHZ during plant normal operations.
- The power supplies for the non-safety related chiller (including the backup DG) are described in Section 3.1.3 of the initial NRC SE, which notes that the dedicated DG fuel oil tank's capacity provides a 12-hour run time for the chiller skid without fuel oil replenishment, which is an adequate time to take replenishing measures from alternate sources.

System Description (cont'd)

- The location of the non-safety related chiller is described in Section 3.1.4 of the initial NRC SE, which notes that in the event that non-safety-related 480V AC source is lost and the skid's DG is required to operate to power the non-safety related chiller, the distance of the skid from the fresh air intakes that any DG exhaust fumes emitted from the skid would be sufficiently dilute so as not to provide a threat to MCR habitability or auxiliary building accessibility.
- The ability of the non-safety related chiller to maintain control room habitability including control room envelope integrity and MCRHZ temperature control is described in Section 3.2 of the initial NRC SE.
- The non-safety related chiller will be controlled under a procedurally controlled T-mod.

Description of the Proposed Change

- The proposed change revises the Required Actions applicable when two CREATCS trains are inoperable. The proposed Required Actions require immediate initiation of an action to implement mitigating actions to ensure control room temperature will not exceed 90°F, or if one CREATCS train is not restored to operable status within 96 hours while in Modes 1, 2, 3, or 4, the unit must be in Mode 3 in 6 hours and Mode 5 in 36 hours. In Mode 5 or 6, or during movement of recently irradiated fuel assemblies, immediate suspension of movement of recently irradiated fuel assemblies is required.

Description of the Proposed Change (cont'd)

- WBN Units 1 and 2 TS 3.7.11

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two CREATCS trains inoperable ~~in MODE 5 or 6, or during movement of irradiated fuel assemblies~~.	D.1 Initiate action to implement mitigating actions~~Suspend movement of irradiated fuel assemblies~~. AND D.2 Verify control room temperature ≤ 90°F. AND D.3 Restore one CREATCS train to OPERABLE status.	Immediately Immediately and once per hour thereafter 96 hours
E. Required Action and associated Completion Time of Condition D not met~~Two CREATCS trains inoperable~~ in MODE 1, 2, 3, or 4.	E.1 Be in MODE 3~~Enter LCO 3.0.3~~. AND E.2 Be in MODE 5	6 hours~~Immediately~~** 36 hours
F. Required Action and associated Completion Time of Condition D not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	F.1 Suspend movement of irradiated fuel assemblies	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.11.1	Verify each CREATCS train has the capability to remove the assumed heat load.	In accordance with the Surveillance Frequency Control Program

~~** An allowance to monitor the main control room temperature every hour and verify the main control room temperature is less than or equal to 90°F is permitted for up to four days in lieu of the~~

Description of the Proposed Change (cont'd)

CREATCS
3.7.11

~~immediate entry into LCO 3.0.3. If the main control room temperature exceeds 90°F, or the duration without a train of CREATCS being OPERABLE exceeds four days, immediate entry into LCO 3.0.3 is required. This provision is only applicable during modification activities planned for the upgrade of the main control room chillers beginning no earlier than July 1, 2023, and ending no later than December 31, 2024, provided compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.~~

Description of the Proposed Change (cont'd)

(Bases Markups)

ACTIONS

A.1

With one CREATCS train inoperable, action must be taken to restore OPERABLE status within 30 days. In this Condition, the remaining OPERABLE CREATCS train is adequate to maintain the control room temperature within limits. However, the overall reliability is reduced because a single failure in the OPERABLE CREATCS train could result in loss of CREATCS function. The 30 day Completion Time is based on the low probability of an event requiring control room isolation, the consideration that the remaining train can provide the required protection, and that alternate safety or nonsafety related cooling means are available, including the option to provide normal cooling with a non-safety related chiller and the remaining train in standby.

Description of the Proposed Change (cont'd)

BASES

ACTIONS

control room. This places the unit in a condition that minimizes accident risk. This does not preclude the movement of fuel to a safe position.

D.1, D.2, and D.3

If both CREATCS trains are inoperable, the CREATCS may not be capable of performing its intended function. Therefore, the control room area temperature is required to be monitored to ensure that temperature is being maintained low enough that equipment in the control room is not adversely affected and habitability is maintained. If air circulation is limited, temperature monitoring in multiple locations in the affected areas may be required in order to ensure that the temperature limit is not exceeded. The following mitigating actions will be used to maintain control room area temperature

- A non-safety related chiller system with a DG to provide power to the non-safety related system will be operated.
- With both CREATCS trains inoperable, TVA will employ a graded approach to defense-in-depth and protected equipment strategies based on the operating status of the affected unit. The risk of the activity will be assessed and managed, including the use of physical barriers as needed.
- TVA procedures will preclude work on or near protected equipment and limit access to the area to emergency situations and non-intrusive monitoring of running equipment per operator rounds.
- Other mitigating actions such as opening cabinet doors, use of fans, use of ice vests, use of alternate (i.e., non-safety-related) ventilation systems, or opening control room doors or ventilation paths, may be employed.

With the control room temperature being maintained within the temperature limit, 96 hours is allowed to restore a CREATCS train to OPERABLE status. This Completion Time is reasonable considering that the main control room (MCR) temperature is being maintained within limits and the low probability of an event occurring requiring control room isolation (Ref 4). The specified temperature limit of 90°F is above the normal operating temperature of the MCR (approximately 75°F), providing operational flexibility when implementing the mitigating actions. This temperature does not impact the operability of equipment or habitability of the MCR. The limit of 90°F maintains margin below the lowest specification for the MCR equipment cabinets of 104°F (Ref. 4).

~~D.1~~

~~In MODE 5 or 6, or during movement of irradiated fuel assemblies, with two CREATCS trains inoperable, action must be taken immediately to suspend activities that could result in a release of radioactivity that might require isolation of the control room. This places the unit in a condition that minimizes risk. This does not preclude the movement of fuel to a safe position.~~

Description of the Proposed Change (cont'd)

BASES

E.1 and E.2

In MODE 1, 2, 3, or 4, if the inoperable CREATCS trains cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes the risk. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems. ~~If both CREATCS trains are inoperable in MODE 1, 2, 3, or 4 the CREATCS may not be capable of performing its intended function. Therefore, LCO 3.0.3 must be entered immediately. The Completion Time is modified by a footnote that states an allowance to monitor the main control room temperature every hour and verify the main control room temperature is less than or equal to 90°F is permitted for~~

Description of the Proposed Change (cont'd)

BASES

ACTIONS

~~up to four days in lieu of the immediate entry into LCO 3.0.3. If the main control room temperature exceeds 90°F, or the duration without a train of CREATCS being OPERABLE exceeds four days, immediate entry into LCO 3.0.3 is required. This provision is only applicable during modification activities planned for the upgrade of the main control room chillers beginning no earlier than July 1, 2023, and ending no later than December 31, 2024, provided the following compensatory measures are implemented as described in TVA letter CNL-20-012, dated May 19, 2020.~~

~~• A temporary, non-safety related chiller system with a temporary DG to provide power to the temporary chiller system will be installed and operated as described in the LAR.~~

~~• Instructions for operation of the temporary cooling equipment will be provided.~~

~~• During replacement of the CREATCS chillers, TVA will employ a graded approach to defense in depth and protected equipment strategies based on the operating status of the affected unit. The risk of the activity will be assessed and managed, including the use of physical barriers as needed. Additionally, TVA procedures preclude work on or near protected equipment and limit access to the area to emergency situations and non-intrusive monitoring of running equipment per operator rounds.~~

~~• During replacement of the CREATCS chillers, no elective maintenance will be performed on TS related support equipment for the Operable CREATCS chiller except for any required TS SRs.~~

~~The purpose of the footnote is to ensure the MCR temperature is being controlled. The specified temperature limit of 90°F is above the normal operating temperature of the MCR (approximately 75°F), providing operational flexibility when implementing the mitigating actions. This temperature does not impact the operability of equipment or habitability of the MCR. The limit of 90°F maintains margin below the lowest specification for the MCR equipment cabinets of 104°F. Subsequent to immediate MCR temperature verification, the one-hour frequency is adequate given the indications available in the MCR. Main control room temperature data is measured and displayed from readily available equipment in the MCR and operators will have awareness of temperature trending relative to the 90°F limit.~~

F.1

In MODE 5 or 6, or during movement of irradiated fuel assemblies, with two CREATCS trains inoperable, action must be taken immediately to suspend activities that could result in a release of radioactivity that might require isolation of the control room. This places the unit in a condition that minimizes risk. This does not preclude the movement of fuel to a safe position.

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Reason for the Proposed Change

- The current WBN 1 and 2 TS 3.7.11 requires an immediate disruption of plant operations in the event both CREATCS trains become inoperable. Allowing for 96 hours to restore an inoperable CREATCS train to operable status minimizes the potential safety consequences and operational risks associated with the disruption of plant operations. The basis for the 96 hours is discussed further in this presentation.
- The proposed change adds a new Condition D for two CREATCS trains inoperable which allows 96 hours to restore one CREATCS train to Operable status by implementing mitigating actions (including the use of a non-safety related chiller) and verifying control temperature is less than or equal to 90°F every hour (consistent with the current temporary measures for the MCR chiller replacement project).

Basis for the 96-hour Completion Time

- In Section 3.4.1.2 of the initial NRC SE, the NRC evaluated the acceptability of a 96-hour completion time with both CREATCS trains inoperable.
- The NRC SE states:

  "The proposed footnote states that operators will monitor the MCR temperature every hour and verify that the temperature is less than or equal to 90°F, for up to 4 days in lieu of immediate entry into LCO 3.0.3. The temperature limit for MCR equipment operability is 104°F, and the normal MCR operating temperature is 75 °F. The licensee provided a calculation of the time that it will take for the MCR and surrounding areas to heat up before the heat-up starts to affect the operability of equipment and challenge operator comfort. The licensee suggests that the calculated time is sufficient enough that operators will be well aware of the heat-up prior to reaching 90 °F, specifically stating, 'the MCR temperature data is measured and displayed from readily available equipment in the MCR and operators will have awareness of temperature trending relative to the 90°F limit'."

Basis for the 96-hour Completion Time

- “The NRC staff reviewed TVA’s proposed operator actions related to the proposed change to Watts Bar, Units 1 and 2, TS 3.7.11, Condition E, and finds them to be acceptable because (1) actions that the operators would perform for a dual-unit shutdown are the same as any entry into TS LCO 3.0.3, (2) there are existing actions that the operators may take to remove heat from the MCR, and (3) there are AOPs to allow for continuous control of the MCR in the case that the MCR temperature cannot be controlled.”

Technical Evaluation

- The non-safety related chiller to be used for temporary cooling of the MCR CREATCS exceeds the minimum capacity of 150 tons noted in the NRC Audit Summary. The cooling load of the area served by the MCR CREATCS is 85 tons, which is significantly lower than the rated capacity of the non-safety related chiller.
- The non-safety related chiller has previously been utilized during replacement of the SDBR Chiller B and the system proved reliable during replacement of that safety-related chiller. The cooling load of the area served by the SDBR chilled water system is 116 tons, which is also significantly lower than the rated capacity of the non-safety related chiller. Thus, the significantly higher rated capacity of the non-safety related chiller ensures that design conditions are maintained during normal and accident modes of operation.

Technical Evaluation

- Also, as described in Section 3.4.1.2 to the NRC SE, there are existing actions operators may take should the operators attempt to remove heat from the MCR. For example, the actions for smoke removal would be useful in removing heated air from the MCR.
- The compensatory measures to be taken when a unit enters TS 3.7.11.D.3 are described in the TS Bases and plant procedures.
- Thus, the proposed 96-hour Completion Time of new Required Action D.3 is considered adequate given the mitigating actions and the low probability of an accident that would require operation of the CREATCS, provides a reasonable time to diagnose, plan, repair, and test most problems with the CREATCS, while minimizing the period of time that control room occupants might have to respond to an event while utilizing the mitigating actions.

Precedent

- Previous WBN LAR approved by NRC (ML21078A484) for a one-time change of a footnote to the Completion Time for WBN Units 1 and 2 TS 3.7.11, Required Action E.1 to allow delayed entry into TS LCO 3.0.3 for up to 96 hours in the event that both CREATCS trains are inoperable during the modifications to the CREATCS chillers.
- 2017 submittal by Constellation (then Exelon) for Byron and Braidwood Nuclear Stations, approved in 2018 (ML18054B436)
- 6/19/2023 submittal by Duke Energy for Catawba (ML23170A015), currently under NRC review

Precedent

- Consistent with Standard and Other WBN TSs:
- Improved Standard TSs allow a Completion Time to restore one inoperable control room cooling train, with two inoperable:
  - NUREG-1432, ISTS for CE Plants (24 hour allowance)
  - NUREG-1433, ISTS for GE BWR/4 Plants (72 hour allowance)
  - NUREG-1434, ISTS for GE BWR/6 Plants (7 day allowance)
- Current WBN TSs provide an extended Completion Time for two or more inoperable trains:
  - TS 3.3.3, Post Accident Monitoring Instrumentation
  - TS 3.4.15, Reactor Coolant System (RCS) Leakage Detection Instrumentation

Schedule Milestones

- TVA to submit LAR to NRC by April 15, 2024.
- Request NRC approval within 1-year from submittal.
- 60-day implementation following NRC approval.


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