

**From:** Green, Kim  
**Sent:** Friday, May 13, 2022 3:08 PM  
**To:** Williams, Gordon Robert  
**Subject:** Draft Request for Confirmation of Information and Additional Information Related to TVA's Request to Use Control Bay Chiller Cross-Tie (EPID L-2021-LLA-0203)  
**Attachments:** Draft RAI 05-13-22.pdf

Dear Mr. Williams,

By letter dated November 5, 2021 (ADAMS Accession No. ML21309A038), the Tennessee Valley Authority (TVA) requested one-time changes to the Browns Ferry Nuclear Plant Technical Specifications (TS) 3.8.7, "Distribution Systems - Operating," to allow for the use of a cross-tie modification between Unit 3 control bay (CB) chilled water system and the Units 1/2 CB chilled water system supplying the electric board room (EBR) air handling units (AHUs). Specifically, TVA requested the addition of Conditions I (Unit 1) and J (Units 2 and 3) with Completion Times of 9 days, and conforming changes all other Conditions for Units 1 and 2, except C (Unit 1) and D (Unit 2), and conforming changes to Unit 3 Conditions G and H so that cross-tie can be installed and tested. Additionally, TVA proposed to revise Browns Ferry Updated Final Safety Analysis Report, section 10.12, "HVAC Systems," and Appendix F, "Unit Sharing and Interactions," to reflect the design modification and to incorporate licensing basis changes describing the Unit 3 CB chilled water system as both a shared system and as an alternate chilled-water source for Unit 1 and Unit 2 EBR AHUs.

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has identified areas where additional information is needed to complete its review. Attached, please find a draft request for additional information (RAI) and request for confirmation of information (RCI).

The draft RAIs and RCI are being sent to ensure that the requests are understandable and the regulatory basis for the requests are clear. This email and the attachment do not convey or represent an NRC staff position regarding TVA's request.

Please let me know if TVA needs a call to clarify the NRC staff's requests.

Sincerely,  
Kimberly J. Green, Senior Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

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**Recipients:**  
"Williams, Gordon Robert" <grwilliams1@tva.gov>  
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REQUEST FOR ADDITIONAL INFORMATION

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

DOCKET NUMBERS 50-259, 50-260, AND 50-296

LICENSE AMENDMENT REQUEST FOR CONTROL BAY CHILLED WATER CROSS-TIE USE

AND ONE-TIME EXCEPTION TO TECHNICAL SPECIFICATION 3.8.7

**Introduction:**

By letter dated November 5, 2021 (ADAMS Accession No. ML21309A038), as supplemented by letter dated April 6, 2022 (ADAMS Accession No. ML22096A328), the Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) to the U.S. Nuclear Regulatory Commission (NRC) requesting one-time changes to the Browns Ferry Nuclear Plant Technical Specifications (TS) 3.8.7, "Distribution Systems - Operating," to allow for the use of cross-tie modification between Unit 3 control bay (CB) chilled water system and the Units 1/2 CB chilled water system supplying the electric board room (EBR) air handling units (AHUs). Specifically, TVA requested the addition of Conditions I (Unit 1) and J (Units 2 and 3) with Completion Times of 9 days, and conforming changes all other Conditions for Units 1 and 2, except C (Unit 1) and D (Unit 2), and conforming changes to Unit 3 Conditions G and H so that cross-tie can be installed and tested. Additionally, TVA proposed to revise Browns Ferry Updated Final Safety Analysis Report, section 10.12, "HVAC Systems," and Appendix F, "Unit Sharing and Interactions," to reflect the design modification and to incorporate licensing basis changes describing the Unit 3 CB chilled water system as both a shared system and as an alternate chilled-water source for Unit 1 and Unit 2 EBR AHUs.

**Regulatory Basis:**

Section 50.36(b) of Title 10 of the *Code of Federal Regulations* (10 CFR) states, in part, "The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to 50.34."

Section 50.36(c)(2)(i) of 10 CFR states, in part, "Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met."

As stated in the LAR, during the construction permit licensing process, each of the three Browns Ferry units was evaluated against the then-current draft of the Atomic Energy Commission (AEC) Proposed General Design Criteria. Units 1 and 2 were evaluated against the AEC-27 Criteria, while Unit 3 was evaluated against the AEC-70 Criteria.

TVA stated that based on its understanding of the intent of the proposed criteria current at the time of operating license application, TVA concluded that each Browns Ferry unit conforms to the intent of the AEC General Design Criteria for Nuclear Power Plant Construction Permits.

*Criterion 5—Sharing of structures, systems, and components.* 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.

### **Requests:**

The following requests are needed so the NRC staff can make a conclusion as to whether the NRC staff's understanding of the proposed changes is correct and that the proposed changes are supported by the justifications provided by in the LAR.

#### **STSB RCI 1**

In Attachment 2 to the supplement, TVA proposes to add conditional phrase “, for reasons other than Condition I (Unit 1) and “, for reasons other than Condition J” (Units 2 and 3) to Conditions A, B, C (Units 2 and 3), D (Unit 1), E, F, G, H (Unit 1), and I (Units 2 and 3).

Confirm that the proposed language being added to the NOTE for Conditions I (Unit 1) and J (Units 2 and 3) means that if the compensatory actions of TVA letter CNL-21-020 are not taken (or found to be not taken) during installation of the Unit 3 control bay chiller cross-tie, then the associated Conditions, Required Actions and Completion Times for the applicable Conditions would apply.

#### **STSB RAI 1**

Proposed Condition I (Unit 1) and Condition J (Units 2 and 3) contain one Required Action. Explain whether another Required Action to verify compensatory actions of TVA letter CNL-21-020 are in place with an appropriate Completion Time (e.g., once per shift) is needed to ensure the TS, as proposed, contains the acceptable remedial measures the operators can take when the LCO is not met. Alternatively, provide wording that would better convey how compensatory measures are meant to be implemented while in Condition I (Unit 1) and Condition J (Units 2 and 3).

#### **STSB RAI 2**

Page E-7 of the LAR contains a description of the cross-tie installation. Condition H (Unit 1 ) and Condition I (Units 2 and 3) are stated as “Two or more electrical power distribution subsystems inoperable that result in a loss of function.” In the supplement, TVA proposed to add the phrase “, for reasons other than Condition I” to Condition H (Unit 1) and “, for reasons other than Condition J.” to Condition I (Unit 2). However, the phrase is not proposed to be added to Condition I for Unit 3.

The current Bases for the Condition description states:

Condition H [I for Units 2 and 3] corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost

[emphasis added]. When more than one AC or DC electrical power distribution subsystem is lost, and this results in the loss of a required function [emphasis added], the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.

- a. Discuss whether a loss of safety function could occur during cross-tie installation and/or testing, including which safety functions on which units could be lost and the potential duration of each loss.
- b. Explain why the proposed addition to Condition H (Unit 1) and Condition I (Unit 2) was not proposed for Unit 3 Condition I.

### **SCPB RAI 1**

The following information is needed to ensure that the sharing of chiller systems will not significantly impair their ability to perform their safety functions during installation.

The LAR indicates that Browns Ferry will take compensatory actions during installation of the Unit 3 CB chilled water cross-tie to reduce risk.

One of the compensatory actions indicates:

Monitor the ambient air temperature in the 1A, 1B, 2A, and 2B EBRs and their associated 480V shutdown board rooms twice per shift and document the temperatures in the narrative logs. If the temperatures in these board rooms exceed 100°F [degrees Fahrenheit], open the associated board room doors and install fans to assist in maintaining the associated temperatures below 100°F. Do not block open the electric board room doors unless their ambient air temperature exceeds 100°F.

The ventilation capability and efficiency of using open doors and fans is unclear, including the effect of the reactor building at 127 °F and/or elevated outdoor ambient air temperature conditions. Provide a discussion on the open doors' and fans' ability to keep the room below the 104 °F design operating limit during cross-tie installation. In event that ventilation using open doors becomes inadequate, describe any additional mitigating or recovery actions that may be taken to prevent the EBR room temperature rising above the 104 °F limit.

### **EEEE RAI 1**

In the supplement, TVA proposed to add Condition I (Unit 1) and J (Unit 2 and 3) for the installation and testing of the cross-tie.

TVA proposed to take exception to the requirements of (1) the existing Conditions A, B, D, E, F, and H when in the proposed new Condition I (Unit 1); (2) the existing Conditions A, B, C, E, F, G, and I when in the proposed new Condition J (Unit 2); and (3) the existing Condition G when in the proposed new Condition J (Unit 3).

The NRC staff notes that the proposed new Conditions I and J would be applicable when two or more electrical power distribution subsystems are inoperable while the existing Conditions A, B,

D, and F (in part) (Unit 1), Conditions A, B, C, E, and G (in part) (Unit 2), and Condition G (in part) (Unit 3) apply to one inoperable board.

It is not clear to the staff if the possibility would exist for only one electrical power distribution subsystem to be inoperable during the installation and testing of the Unit 3 control bay chiller cross-tie, and if so, which Conditions, Actions and Completion Times would be applicable.

State whether during the installation and testing of the Unit 3 control bay chiller cross-tie only one electrical power distribution subsystem could be inoperable, and if so, which Condition(s), Required Action(s), and Completion Time(s) would apply.

## **EEEB RAI 2**

In Section 2.2 of the LAR, TVA explained that the installation is expected to last 43 hours based on the estimated work steps required to install and leak check the prepared piping spool sections at the Units 1 and 2 chilled water piping. TVA further stated:

An additional 7 days is also requested for flow-balancing the system with the Unit 3 chiller cross-tie aligned to the Unit 1 and Unit 2 EBR AHUs. During this time, the Unit 1 and Unit 2 EBR AHUs and the aligned Unit 3 CB chilled water system train will be available but will not be OPERABLE. The standby Unit 3 CB chilled water system train and both Unit 1/2 CB chilled water system trains remain OPERABLE. Because the limiting EBR takes approximately 24 hours to reach 104°F, there is ample time to realign the systems to their normal configurations before cooling is needed. Therefore, the requested time to complete the installation and testing and to restore the affected electrical power distribution subsystems to OPERABLE status is 9 days, 2 days for installation and 7 days for testing.

No explanation or justification was provided for the 7-day testing/flow-balancing period.

Provide a justification for the 7-day completion time for testing/flow-balancing the cross-tie.

## **EEEB RAI 3**

In the supplement, for the TS Bases for Required Action I.1 associated with new Condition I, the following is stated:

In this Condition the equipment in the Unit 1 and Unit 2 electrical board rooms are considered not OPERABLE because chilled water will be isolated from the air handling units in those rooms. Without chilled water to those air handling units during a design basis accident, the temperature in the Unit 1 and Unit 2 electrical board rooms would eventually increase above design limits.

While not OPERABLE, the electrical power distribution subsystems are able to perform their safety function until the temperature in the Unit 1 and Unit 2 electrical board rooms exceed the design limits. At that point, the expected service life of equipment in those rooms are shortened by the increased temperatures. Given the most limiting boardroom reaches the design-limit temperature in approximately 24 hours with no mitigating actions taken, there is sufficient time during installation to restore the chilled water to the Unit 1 and Unit

2 electrical board room air handling units to prevent the temperature in the Unit 1 and Unit 2 electrical board rooms from reaching the design limits.

- a. Although the Bases are not part of the TSs, 10 CFR 10 CFR 50.36 (b), states that the TSs are derived from the analyses and evaluation included in safety analysis report. The NRC staff could not locate the basis for 104 °F design temperature limit for the EBRs in the Browns Ferry Updated Final Safety Analysis Report (UFSAR).

Provide the basis for the design limit temperature of 104°F for the EBRs, and a markup of UFSAR and TS Bases, if necessary.

- b. In the LAR on Page E7, the following is stated: “Current analysis indicates that the Unit 1 and Unit 2 EBRs will not reach the design operating limit of 104°F for approximately 24 hours during a design-basis accident when no cooling is provided to the EBRs, the doors are closed, and the reactor building is already at 127°F.”

In the LAR on Page E2, the following is stated: “In conditions when both EBR air conditioning systems are inoperable, consistent with the TS definition of OPERABLE-OPERABILITY, the Technical Requirements Manual (TRM) requires immediately declaring the electrical equipment in the EBRs inoperable.”

Based on above statements, it is not clear to the NRC staff at what temperature the electrical equipment in the EBRs is considered inoperable. The staff could not determine the rationale of linking the TRM to the TSs for immediately declaring the electrical equipment in the EBRs inoperable.

Provide the temperature at which the EBR electrical equipment is declared inoperable. Also, provide the initial temperature in the EBRs, that was considered to calculate the 24 hours to reach 104 °F during a design-basis accident.