TENNESSEE VALLEY AUTHORITY
1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-043

May 2, 2022

10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390 and 391

Subject: Response to Request for Additional Information and Confirmation of Information Regarding Application to Modify Watts Bar Nuclear Plant Units 1 and 2 Technical Specification 3.7.8 to Support Shutdown Board Cleaning (WBN-TS-19-019) (EPID L-2021-LLA-0174)

References:
1. TVA letter to NRC, CNL-21-062, "Application to Modify Watts Bar Nuclear Plant Units 1 and 2 Technical Specification 3.7.8 to Support Shutdown Board Cleaning (WBN-TS-19-019)," dated September 29, 2021 (ML21273A046)
2. NRC electronic mail to TVA, "Request for Additional Information and Confirmation of Information Related to TVA's Request for Changes to Watts Bar Nuclear Plant, Units 1 and 2, Technical Specification 3.7.8 (EPID L-2021-LLA-0174)," dated March 24, 2022 (ML22083A237)

In Reference 1, Tennessee Valley Authority (TVA) submitted a request for an amendment to Facility Operating License Nos. NPF-90 and NPF-96 for the Watts Bar Nuclear Plant (WBN), Units 1 and 2, respectively. The proposed amendment revises WBN Units 1 and 2 Technical Specification (TS) 3.7.8 to support future maintenance on the WBN Units 1 and 2 Shutdown Boards and associated 480 Volt boards and motor control centers on a permanent basis.

In Reference 2, the Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI) and request for confirmation of information (RCI) and requested TVA respond by May 2, 2022.

The enclosure to this submittal provides the TVA response to the RAI and RCI. As noted in the enclosure, the TVA response to STSB RCI-1 requires a change to the proposed TS changes in Reference 1. Accordingly, Attachment 1 to the enclosure provides the existing WBN Units 1 and 2 TS pages marked-up to show the revised proposed change. Attachment 2 to the enclosure provides the existing WBN Units 1 and 2 TS page retyped to show the revised proposed change. There are no changes to the WBN Units 1 and 2 TS Bases provided in Reference 1. The TS changes in Attachments 1 and 2 to the enclosure supersede those provided in Reference 1. Attachment 3 to the enclosure provides further information in response to RAIs SCPB RAI-1 and SCPB RAI-2.

This letter does not change the no significant hazard considerations or the environmental considerations contained in Reference 1. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosure to the Tennessee Department of Environment and Conservation.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Stuart L. Rymer, Senior Manager, Fleet Licensing, at slrymer@tva.gov.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 2nd day of May 2022.

Respectfully,

Digitally signed by Rearden, Pamela S
Date: 2022.05.02 13:57:58 -04'00'

James Barstow
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure: Response to Request for Additional Information and Confirmation of Information

cc (Enclosure):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant
NRC Project Manager – Watts Bar Nuclear Plant
Director, Division of Radiological Health – Tennessee State Department of Environment and Conservation

Response to Request for Additional Information and Confirmation of Information

NRC Introduction

By letter dated September 29, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21273A046), the Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) to the U.S. Nuclear Regulatory Commission (NRC) for the Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2. The proposed amendments would revise Watts Bar, Unit 1 and 2, Technical Specification (TS) 3.7.8, "Essential Raw Cooling Water (ERCW) System," by adding a new Condition A to Watts Bar, Unit 1, TS 3.7.8, to permanently extend the allowed Completion Time to restore one ERCW system train to operable status from 72 hours to 7 days, to support maintenance on the Watts Bar, Unit 2, 6.9 kilovolt shutdown boards. The proposed amendments would also revise the bounding temperature for the ultimate heat sink (UHS) in Condition A to less than or equal to 78 degrees Fahrenheit. Additionally, the proposed amendments would add and/or revise the Note, numbering, and wording of the Conditions to specify when the Conditions apply.

Regulatory Bases:

General Design Criterion (GDC) 44, "Cooling Water," requires, in part, that the system safety function shall be to transfer heat loads to the ultimate heat sink under normal and accident conditions, and that suitable redundancy in components shall be provided to assure that the system safety function can be accomplished, assuming a single failure.

Section 4.1 of the Enclosure to the LAR indicates that the ERCW system is designed to comply with GDC 44. Sections 3.2.4, 3.2.5, and 3.2.6 of the Enclosure to the LAR provide TVA's thermal and hydraulic analyses to demonstrate that the operation of the ERCW system under the proposed LAR conditions (e.g., revised UHS temperature limit, reduced number of operable ERCW pumps and EDGs, and one unit defueled) will be able to maintain its GDC 44 capabilities to perform its safety function of adequate component cooling capability for a design basis accident under the most limiting single failure.

SCPB RAI-1

In TVA's thermal analyses, Table 8 and Table 9 of the Enclosure to the LAR listed the following design parameters to compare against calculated values to show the margin of the heat removal capability (left column).

Parameter	***Design Minimum (Current LAR) Btu/hr***	***Design Maximum (Previous LAR) Btu/hr***
A/B Train – Component Cooling System (CCS) Heat Exchanger (HX) Duty	*88,764,506*	*106,183,506*
Residual Heat Removal HX Duty	*54,800,000*	*54,800,000*
Spent Fuel Pool HX Duty	*32,420,000*	*32,420,000*
Core Spray System (CSS) HX Duty	*87,323,731*	*81,294,921*

The design of the ERCW in the proposed LAR has not been changed since the previous LAR for a similar analysis (ADAMS Accession No. ML19038A483). However, the NRC staff noted that the design values for the CCS HX Duty and CSS HX Duty in the proposed LAR are inconsistent with those data used in the previous LAR (right column, see Table 5 of

Enclosure 1). For example, the design value (minimum) for the CSS HX duty for the current LAR is higher than the design value (maximum) for the CSS HX duty for the previous LAR. Also, the design values (minimum and maximum) for the RHR HX duty and spent fuel pool HX duty are the same.

Provide the following:

a. *Explain the above apparent inconsistences*

b. *Clarify which values (minimum or maximum) should be used for the determination of the margin of the heat removal capability and revise accordingly, if needed, and*

c. *Identify the source of the design data used for the current LAR.*

TVA Response

a. The change from “maximum” in the current LAR (Reference 1) to “minimum” in the previous LAR (Reference 2) was a change in terminology only.

   The previous LAR used “design maximum” to signify the maximum duty of each HX during accident conditions. However, comparisons between predicted capability of the HX to remove heat and the required duty should show predicted capability greater than the required duty. Therefore; utilizing “design minimum,” signifying the minimum heat removal requirement of the HX during an accident, is the more appropriate terminology. The two uses are functionally equivalent; the maximum HX duty listed in Table 5 of the previous LAR is equivalent to the minimum heat removal requirement listed in Tables 8 and 9 of the current LAR.

   Changes in values from the previous LAR are explained in the response to SCPB RAI-2.

b. See response in Part a of this RAI response.

c. The following table identifies the source of the design data used for the current LAR.

Parameter	Source of Required Duty Design Data
CCS HX Duty	Tables 13A and 31 for the limiting accident case of the CCS Load List calculation. See Attachment 3 to this enclosure for an explanation of the differing values from the current LAR and the previous LAR.
Residual Heat Removal (RHR) HX Duty	Tables 13A and 31 for the limiting accident case of the CCS Load List calculation.
Spent Fuel Pool (SFP) HX Duty	100-hour full core offload maximum from the Alternate SFP Decay Heat calculation.
CSS HX Duty	Appendix B of the calculation that evaluates the CSS Heat Exchangers for a decrease in ERCW Flow Rate. See Attachment 3 of this enclosure for an explanation of the differing values from the current LAR (Reference 1) and the previous LAR (Reference 2).

SCPB RAI-2

Section 3.2.4 of the Enclosure to the LAR describes the thermal hydraulic evaluation method developed by TVA to support its request to extend the completion time for restoring one train of ERCW to operable status and to increase the UHS temperature. The methodology of the current analysis is similar to the one developed for the previous LAR (ADAMS Accession No. ML19038A483). Section 3.2.7 of both LARs (current and previous) list the analysis assumptions and conservatisms used in the respective analysis. In addition to the differences as identified in SCPB RAI-1 above, the NRC staff noted some differences in the assumptions and conservatisms. For example, in the current LAR, the flow values determined in the ERCW hydraulic analysis are reduced by 5 percent, whereas in the previous analysis, the flow values were reduced by 10 percent. Also, for the CSS HX model (LAR Section 3.2.6.1), the benchmarked PROTO-HX model for the LOCA analysis assumed 10 percent of the tubes were plugged, whereas in the previous LAR model, 5 percent of the tubes were assumed to be plugged (LAR Section 3.2.5.1).

a. *Confirm or clarify whether the methodology developed for the proposed LAR is the same as, or different from, the methodology developed for the previous LAR.*
b. *Identify all the differences (including, but not limited to the above examples) in the assumptions, methodology, and acceptance criteria.*
c. *Provide the reasons for any differences.*

TVA Response

a. The methodology for the proposed LAR (Reference 1) is the same as the methodology developed for the previous LAR (Reference 2) except for the differences detailed in Attachment 3 to this enclosure.

b. The differences in the assumptions, methodology, and acceptance criteria are described in the response in Attachment 3 to this enclosure regarding Methodology, Assumptions, and Design Input differences.

c. The requested information is described in Attachment 3 to this enclosure.

STSB RCI-1

Regulatory Basis:

Pursuant to 10 CFR 50.36, TSs for operating reactors are required, in part, to include items in the following five specific categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls.

Issue:

The proposed Condition C states: "Required Action and associated Completion Time of Condition A not met."

Proposed Required Action A.2 states "Verify UHS temperature is ≤ 78° F" with a Completion Time of 1 hour.

Required Action A.1 and A.2 are joined by the logical connector "AND." As the proposed TS is currently constructed, if while in Condition A the temperature were to exceed 78° F, Required Action A.2 would not be met, and Condition C would be entered. Therefore, the purpose of the second part of the Completion Time for Required Action A.1 it is not clear to the NRC staff .

Request:

Confirm that this is the intent of the proposed TS.

TVA Response

The proposed change to Condition C of WBN Units 1 and 2 TS 3.7.8 in the Reference 1 LAR was in error. TVA is revising Condition C of Watts Bar Nuclear Plant (WBN), Units 1 and 2 TS 3.7.8 from "*Required Action and associated Completion Time of Condition A not met." to "Required Action A.1 and associated Completion Time not met.*" Attachment 1 to this enclosure provides the existing WBN Units 1 and 2 TS pages marked-up to show the revised proposed change. Attachment 2 to this enclosure provides the existing WBN Units 1 and 2 TS page retyped to show the revised proposed change. There are no changes to the WBN Unit 1 and Unit 2 TS Bases provided in Reference 1. The TS changes in Attachments 1 and 2 to the enclosure supersede those provided in Reference 1.

In the Reference 3 safety evaluation (SE), WBN Unit 2 TS 3.7.8, Condition C was revised to state "*Required Action A.1 and associated Completion Time not met.*" However, in Reference 1, TVA stated:

> "*WBN Unit 2 TS 3.7.8, Condition C is revised to change 'Required Action A.1 and associated Completion Time not met,' to 'Required Action and associated Completion Time of Condition A not met.' This is an administrative change to reflect that Condition C applies to both Required Actions A.1 and A.2.*"

A similar change was also made to WBN Unit 1 TS 3.7.8, Condition C. If Action A.2 of WBN Units 1 and 2 TS 3.7.8 (i.e., verify UHS temperature is less than or equal to 78°Fahrenheit (F) within one hour and once every 12 hours thereafter) is not met then the affected unit enters Action A.1 of WBN Units 1 and 2 TS 3.7.8, which requires restoration of an ERCW train to Operable status within seven days and 24 hours from discovery of Condition A entry greater than or equal to 48 hours concurrent with UHS temperature greater than 78°F. This logic is consistent with Section 2.3 of Reference 1, which states:

> *"If UHS temperature exceeds 78ºF after 48 hours of continuous ERCW train inoperability, then the specified conditions for crediting the availability of the inoperable ERCW train are no longer met and action must be taken to restore the ERCW train to an operable status within 24 hours. Otherwise, the unit must enter WBN Unit 2 TS 3.7.8, Condition C, which requires the unit to be in Mode 3 within six hours and Mode 5 within 36 hours. If UHS temperature is discovered to be > 78º F, prior to 48 hours of continuous operation in Condition A, then the 24-hour Completion Time to restore the inoperable ERCW train to operable status starts after 48 hours of continuous operation in Condition A. However, the proposed change to WBN Unit 2 TS 3.7.8 does not allow continued operation in Condition A for greater than seven days."*

As noted in Reference 4, the above logic is "*similar to WBN Units 1 and 2 TS 3.8.1, Condition B for the extended allowed outage time allowed for an inoperable diesel generator that also relies on the availability of a compensatory measure*." Specifically. the Completion Time for WBN Units 1 and 2 TS 3.8.1, Required Action B.5 allows "*72 hours from discovery of unavailability of 6.9 kV FLEX DG* AND *24 hours from discovery of Condition B entry ≥ 48 hours concurrent with unavailability of 6.9 kV FLEX DG*."

References

1. TVA letter to NRC, CNL-21-062, "Application to Modify Watts Bar Nuclear Plant Units 1 and 2 Technical Specification 3.7.8 to Support Shutdown Board Cleaning (WBN-TS-19-019)," dated September 29, 2021 (ML21273A046)
2. TVA letter to NRC, CNL-19-014, "Application to Modify Watts Bar Nuclear Plant Unit 2 Technical Specifications 3.7.8 to Extend the Completion Time for an Inoperable Essential Raw Cooling Water Train on a One-Time Basis (WBN-TS-18-07)," dated February 7, 2019 (ML19038A483)
3. NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 2- Issuance of Amendment No. 35 Regarding One-Time Extension of Completion Time for Technical Specification 3.7.8 for Inoperable Essential Raw Cooling Water Train (EPID L-2019-LLA-0020)," dated February 24, 2020 (ML20024F835)
4. TVA letter to NRC, CNL-19-124, "Response to Request for Additional Information to Application to Modify Watts Bar Nuclear Plant Unit 2 Technical Specifications 3.7.8 to Extend the Completion Time for an Inoperable Essential Raw Cooling Water Train on a One-Time Basis (WBN-TS-18-07) (EPID L-2019-LLA-0020)," dated January 13, 2020 (ML20014D230)

Enclosure

Attachment 1

Revised Proposed TS Changes (Markups) for WBN Units 1 and 2

3.7 PLANT SYSTEMS

3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
------------------NOTES------------------- 1. Only applicable when Unit 2 is defueled. 2. Only applicable during planned maintenance of a Unit 2 6.9kV shutdown board and the associated 480V boards and motor control centers. --- A. One ERCW train inoperable.	A.1 ------------------NOTES------------ 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. --------------------------------------- Restore ERCW train to OPERABLE status. <u>AND</u>	7 days <u>AND</u> 24 hours from discovery of Condition A entry ≥ 48 hours concurrent with UHS temperature > 78°F.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2 Verify UHS temperature is ≤ 78°F.	1 hour AND Once every 12 hours thereafter.
~~A~~B. One ERCW train inoperable for reasons other than Condition A, ~~other than for Condition C~~.	~~A~~B.1 ------------------NOTES------------ 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for emergency diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. --- Restore ERCW train OPERABLE status.	 72 hours
~~B~~C. Required Action A.1 and associated Completion Time not met. OR Required Action and associated Completion Time of Condition B not met.	~~B~~C.1 Be in MODE 3. AND ~~B~~C.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.8.1	-----------------------------NOTE----------------------------- Isolation of ERCW flow to individual components does not render the ERCW inoperable. -- Verify each ERCW manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.2	Verify each ERCW automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.3	Verify each ERCW pump starts automatically on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program

3.7 PLANT SYSTEMS

3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
----------------NOTES---------------- 1. ~~Only applicable during the Unit 1 spring 2020 outage (U1R16), but no later than May 31, 2020.~~ ~~2.~~ Only applicable when Unit 1 is defueled. ~~3~~2. Only applicable during planned maintenance of a Unit 1 ~~n~~ 6.9 kV shutdown board and the ~~1 A-A and~~ associated 480 V boards and motor control centers. ---	A.1	------------NOTES----------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops - MODE 4," for residual heat removal loops made inoperable by ERCW. ---------------------------------	
A. One ERCW train inoperable.		Restore ERCW train to OPERABLE status.	7 days <u>AND</u> 24 hours from discovery of Condition A entry ≥ 48 hours concurrent with UHS temperature > 7~~1~~8 °F
	<u>AND</u>		

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2	Verify UHS temperature is ≤ 7~~1~~8° F.	1 hour <u>AND</u> Once every 12 hours thereafter
B. One ERCW train inoperable for reasons other than Condition A.	B.1	-----------NOTES------------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. ---------------------------------- Restore ERCW train to OEPRABLE status.	72 hours
C. Required Action A.1 and associated Completion Time not met. <u>OR</u> Required Action and associated Completion Time of Condition B not met.	C.1 <u>AND</u> C.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

Enclosure

Attachment 2

Revised Proposed TS Change (Final Typed) for WBN Units 1 and 2

3.7 PLANT SYSTEMS

3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
------------------NOTES------------------ 1. Only applicable when Unit 2 is defueled. 2. Only applicable during planned maintenance of a Unit 2 6.9kV shutdown board and the associated 480V boards and motor control centers. -- A. One ERCW train inoperable.	A.1 ------------------NOTES------------ 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. -- Restore ERCW train to OPERABLE status. AND	7 days AND 24 hours from discovery of Condition A entry ≥ 48 hours concurrent with UHS temperature > 78°F.
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2 Verify UHS temperature is ≤ 78°F.	1 hour <u>AND</u> Once every 12 hours thereafter.
B. One ERCW train inoperable for reasons other than Condition A.	B.1 ------------------NOTES------------ 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for emergency diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. -- Restore ERCW train OPERABLE status.	 72 hours
C. Required Action A.1 and associated Completion Time not met. <u>OR</u> Required Action and associated Completion Time of Condition B not met.	C.1 Be in MODE 3. <u>AND</u> C.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.8.1	-----------------------------NOTE----------------------------- Isolation of ERCW flow to individual components does not render the ERCW inoperable. --- Verify each ERCW manual, power operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in the correct position.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.2	Verify each ERCW automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.3	Verify each ERCW pump starts automatically on an actual or simulated actuation signal.	In accordance with the Surveillance Frequency Control Program

3.7 PLANT SYSTEMS

3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
----------------NOTES---------------- 1. Only applicable when Unit 1 is defueled. 2. Only applicable during planned maintenance of a Unit 1 6.9 kV shutdown board and the associated 480 V boards and motor control centers. -- A. One ERCW train inoperable.	A.1	------------NOTES----------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops - MODE 4," for residual heat removal loops made inoperable by ERCW. --------------------------------- Restore ERCW train to OPERABLE status.	7 days <u>AND</u> 24 hours from discovery of Condition A entry ≥ 48 hours concurrent with UHS temperature > 78 °F
	<u>AND</u>		

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2	Verify UHS temperature is ≤ 78° F.	1 hour AND Once every 12 hours thereafter
B. One ERCW train inoperable for reasons other than Condition A.	B.1	-----------NOTES------------- 1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources- Operating," for diesel generator made inoperable by ERCW. 2. Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops-MODE 4," for residual heat removal loops made inoperable by ERCW. --------------------------------- Restore ERCW train to OEPRABLE status.	 72 hours
C. Required Action A.1 and associated Completion Time not met. OR Required Action and associated Completion Time of Condition B not met.	C.1 AND C.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours

METHODOLOGY

The methodology applied in the proposed license amendment request (LAR) (Reference 1) analysis is essentially the same as that applied in the previous LAR (Reference 2). Assumptions and design inputs are compared in the table below and differences are explained. The significant differences are as follows.

1. The current LAR analysis credits the Essential Raw Cooling Water (ERCW) system modifications, which replaced and relocated the discharge valve from the component cooling system (CCS) heat exchanger (HX) C (0-FCV-67-152), cross-ties the CCS HX ERCW discharge header by opening existing valves, and rebalances ERCW header flow. These alignment changes modify ERCW hydraulic performance.
2. Margins added to individual design inputs/outputs were removed or minimized to eliminate stacking of margins and provide a more realistic prediction of available ERCW cooling water flow rates and maximum allowable ERCW temperature. The most significant example is the reduction of the predicted ERCW flows by five percent (%) rather than 10%, as was applied in the previous LAR analysis method. Other examples are provided in Tables 1 and 2.

   Margin was removed to gain a larger range of acceptable ERCW temperatures for the permanent two-season LAR (note the resultant increase in acceptable maximum ultimate heat sink (UHS) temperature from 71° F to 78° F to support autumn river temperatures). It was also considered that this approach allows a more accurate assessment of margin by design engineering and the regulator, since margin can be analyzed by examining only the conclusions of the analysis rather than considering both the conclusions and any subsidiary “supporting” margins.
3. The thermal performance calculations for each heat exchanger and heating, ventilation, and air conditioning (HVAC cooler were revised to incorporate curves of thermal performance as a function of ERCW flow rate and temperature rather than executing the models within the SDBD Cleaning calculation. This was done to incorporate station configuration changes and to ensure future revisions to these calculations are evaluated for impact to the LAR analysis. These analyses use the same methods and inputs as those in the previous LAR, with exceptions noted in the tables below.

<u>References</u>

1. TVA letter to NRC, CNL-21-062, “Application to Modify Watts Bar Nuclear Plant Units 1 and 2 Technical Specification 3.7.8 to Support Shutdown Board Cleaning (WBN-TS-19-019),” dated September 29, 2021 (ML21273A046)
2. TVA letter to NRC, CNL-19-014, “Application to Modify Watts Bar Nuclear Plant Unit 2 Technical Specifications 3.7.8 to Extend the Completion Time for an Inoperable Essential Raw Cooling Water Train on a One-Time Basis (WBN-TS-18-07),” dated February 7, 2019 (ML19038A483)

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.1	Minimum ERCW pump performance is assumed by specifying a lower bounding head versus flow curve relative to the vendor pump curves. **Technical Justification:** This ensures that the actual ERCW flow rates supplied in this unlikely accident scenario will conservatively exceed the analysis predicted flow rates.	5.1	Minimum ERCW pump performance is assumed by specifying a lower bounding head versus flow curve relative to the vendor pump curves. **Technical Justification:** This ensures that the actual ERCW flow rates supplied in this unlikely accident scenario will conservatively exceed the analysis predicted flow rates.	None	

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.2	The flow values determined in the ERCW hydraulic analysis are reduced by ten percent to account for the measurement and analysis uncertainties. **Technical Justification:** This reasonably bounds the uncertainties associated with baseline model development and testing.	5.2	The flow values determined in the ERCW hydraulic analysis are reduced by five percent to account for analysis uncertainties. **Technical Justification:** This reasonably bounds the uncertainties associated with baseline model development and testing.	Predicted ERCW flow rates are reduced by 5% instead of 10%	The additional margin from the 10% reduction is deemed overly conservative considering the minimum ERCW pump performance curve applied in both analyses under Assumption 5.1. This allows the margin to be retained in the proposed technical specification (TS) temperature limit versus potentially narrowing the gap between the proposed limit and the actual UHS temperature expected during the spring and fall outages.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.3	Maximum heat transfer to the CCS is assumed in order to maximize the CCS heat exchanger ERCW outlet temperature. This is accomplished by specifying zero fouling inside and outside of the heat exchanger tubes and zero plugged tubes in the respective PROTO-HX models. **Technical Justification:** This maximizes the ERCW heat load, which is conservative with respect to the objective.	5.3	Maximum heat transfer to the CCS is assumed in order to maximize the CCS heat exchanger ERCW outlet temperature. This is accomplished by specifying zero fouling inside and outside of the heat exchanger tubes and zero plugged tubes in the respective PROTO-HX models. **Technical Justification:** This maximizes the ERCW heat load, which is conservative with respect to the objective.	None	
5.4	The ERCW system B-train fails in its entirety. **Technical Justification:** No credit is taken for the Unit 1 B-train equipment even though the Unit 1 B-train diesel generator and SDBD are likely to be available. This is a conservative assumption which maximizes the demand on the A-train of ERCW.	5.4	The emergency power train failure is assumed to apply to both units such that no credit is taken for the shutdown unit associated equipment even though the shutdown unit diesel generator and SDBD are likely to be available. **Technical Justification:** This is a conservative assumption which maximizes the demand on the available train of ERCW.	None	Generalized to dual-unit LAR.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.5	The 1A-A 6.9kV Shutdown Board is not removed from service until WBN Unit 1 is in a refueling outage, with the fuel removed. **Technical Justification:** This is stipulated as a limiting condition for operation in the subject LAR system alignment.	5.5	The respective 6.9kV SDBD is not removed from service until the shutdown unit is in a refueling outage, with the fuel removed. **Technical Justification:** This is stipulated as a limiting condition for operation in the subject LAR system alignment.	None	Generalized to dual-unit LAR.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.6	The spent fuel pool (SFP) heat load is maximized by assuming that the full core offload for the refueling unit occurs at 100 hours after shutdown. This is conservative because the earliest time defueling can begin per WBN Units 1 and 2 TS 3.9.10, "Decay Time," is 100 hours, and the 1A-A 6.9kV SDBD outage cannot begin until the full core has been offloaded per the LAR. Therefore, the outage on the 1A-A 6.9kV SDBD selected for maintenance does not begin until WBN Unit 1 has been shut down for at least 100 hours. **Technical Justification:** This is stipulated as a limiting condition for operation in the subject LAR system alignment and is consistent with the TVA Alternate SFP Decay Heat Analysis.	5.6	The SFP heat load is maximized by assuming that the full core offload for the refueling unit occurs at 100 hours after shutdown. This is conservative because the earliest time defueling can begin per TS 3.9.10 is 100 hours, and the SDBD outage cannot begin until the full core has been offloaded per the LAR. Therefore, the outage on the 6.9kV SDBD selected for maintenance does not begin until the unit has been shut down for at least 100 hours. **Technical Justification:** This is stipulated as a limiting condition for operation in the subject LAR system alignment and is consistent with the TVA Alternate SFP Decay Heat Analysis.	The previous LAR applied a CCS HX duty acceptance criterion of 106,183,506 BTU/hr versus the current LAR value of 88,764,506 BTU/hr.	The previous LAR value incorporated a beyond design basis SFP load of 50,215,000 BTU/hr deemed overly conservative. The design basis SFP heat load of 32,420,000 BTU/hr plus the shutdown unit seal water HX duty of 376,000 BTU/hr are applied in the current LAR.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.7	It is assumed that all Unit 1, non-essential cooling loads are isolated prior to and in preparation for removal of the SDBD from service. **Technical Justification:** This is stipulated as a limiting condition for operation in the subject LAR system alignment.	5.7	It is assumed that all shutdown unit, non-essential cooling loads supplied by the train in service post loss of offsite power (LOOP)/loss of train (LOT) are isolated prior to and in preparation for removal of the SDBD from service. **Technical Justification:** This is stipulated as a limiting condition for operation in the subject LAR system alignment.	None	Generalized to dual-unit LAR.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.8 and 5.9	It is assumed that the SFP is initially at the maximum normal temperature of 127 degrees Fahrenheit (°F). **Technical Justification:** This maximizes the heat load on the CCS and ERCW system and minimizes the time for SFP heat-up and approach to boiling. It is assumed that the SFP heats up following initial loss of cooling to a temperature less than or equal to 159.24°F. **Technical Justification:** As the SFP temperature increases, the heat transfer to the CCS increases until the SFP decay load is matched. This temperature is the design maximum SFP temperature from the Tennessee Valley Authority (TVA) Alternate SFP Decay Heat Analysis.	5.8	It is assumed that the SFP is initially at the maximum temperature of 159.24°F. **Technical Justification:** This temperature is consistent with the maximum allowable SFP heat load which established this as the design maximum SFP temperature from the TVA Alternate SFP Decay Heat Analysis.	Loss of spent fuel pool cooling and pool heat-up from the maximum normal operation temperature of 127°F is not postulated in the current analysis.	No credit was taken for SFP heat-up from 127 F to 159.24 F in either analysis.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
N/A	It is assumed that the ERCW water temperature is 85°F for this hydraulic analysis. **Technical Justification:** The base case models set this temperature at the UHS maximum of 85°F.	5.9	It is assumed that the ERCW water temperature is 70° F for this hydraulic analysis. **Technical Justification:** The base case models set this temperature at the UHS maximum of 85°F. Specifying 70°F for this analysis conservatively increases the water density and hydraulic resistance, consistent with expected results in the 70°F to 80°F range.	ERCW temperature for hydraulic analysis reduced by 15°F.	Provides a more conservative prediction of delivered flow rates and is not applied in the heat transfer analyses. This temperature reduction accounts for a minor increase in the hydraulic resistance on the order of 0.2%.
5.10	For the 1A-A SDBD maintenance, it is assumed that SFP cooling will be transferred from the A SFP HX to the B SFP HX. **Technical Justification:** For this scenario, only one CCS pump supplying the Unit 2 A CCS train is available due to loss of the redundant power supplies to the C-S CCS pump (LOT B and loss of the 1A-A SDBD).	N/A	N/A (Similar alignments are implemented for each SDBD cleaning scenario as required and explained in detail in the analysis).	None	This assumption is specific to the 1A-A SDBD cleaning scenario. However, this is generalized to the dual-unit LAR by evaluating similar alignments for each additional case in the current LAR.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.11	It is assumed that ERCW flow to the Auxiliary Feedwater (AFW) is isolated for this analysis. **Technical Justification:** This is conservative, as the AFW pumps take suction from the ERCW discharge headers. Flow to the AFW pumps would reduce the ERCW discharge flow and the backpressure in the discharge headers, resulting in higher available flow rates to all users of ERCW. Also, the ERCW discharge header flow rate and elevation (730'-6") relative to the AFW pump elevation (715'-1") are such that more than adequate suction head and flow is available to supply the AFW pumps.	5.10	It is assumed that ERCW flow to the AFW is isolated for this analysis. **Technical Justification:** This is conservative, as the AFW pumps take suction from the ERCW discharge headers. Flow to the AFW pumps would reduce the ERCW discharge flow and the backpressure in the discharge headers, resulting in higher available flow rates to all users of ERCW.	The current LAR assumption did not specifically address the potential impact to AFW pump available net positive suction head.	The current LAR analysis also provides more than adequate suction head for the AFW pumps based on the discharge header flow rate and elevation relative to the AFW pumps suction.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.12	The SFP heat load, for analysis purposes, is conservatively assumed to be the design basis 100 hour full core offload maximum of 32.42 MBtu/hr listed in Table 7.2 of the Alternate SFP Decay Heat Analysis. Because the 1A-A 6.9 kV SDBD outage cannot begin, due to LAR restrictions, until the full core offload is complete, the actual fuel pool total heat load will be less due to the additional time, not considered herein, and required to offload the core (approximately 40 hours). Technical Justification: This is the SFP heat load used to establish the design maximum pool temperature of 159.24°F. This heat load is applied as the minimum acceptance criterion to which the predicted SFP HX duty under the LAR conditions is compared to demonstrate the available heat transfer margin. It is noted that actual conditions will be utilized to determine the time to begin WBN Unit 1 core offload	5.11	The SFP heat load, for analysis purposes, is conservatively assumed to be the design basis 100 hour full core offload maximum consistent with the predicted CCS temperature in Table 7.2 of the Alternate SFP Decay Heat Analysis. Because the 6.9 kV SDBD outage cannot begin, due to analysis restrictions, until the full core offload is complete, the actual fuel pool total heat load will be less due to the additional time, not considered herein, and required to offload the core (approximately 40 hours). Technical Justification: This is the SFP heat load used to establish the design maximum pool temperature of 159.24°F. This heat load is applied as the minimum acceptance criterion to which the predicted SFP HX duty under the LAR conditions is compared to demonstrate the available heat transfer margin. It is noted that actual conditions will be utilized to determine the time to begin core offload and the rate at	None	

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
	and the rate at which the WBN Unit 1 core can be off loaded, as described in WBN dual-unit Final Safety Analysis Report (UFSAR) Section 9.1.3.1.		which the core can be off loaded, as described in UFSAR Section 9.1.3.1.1.		

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.13	The maximum residual heat removal (RHR) HX duty of 54,80,000 Btu/hr (loss of cooling accident (LOCA)-RECIRC mode) and design CCS flowrate of 5000 gallons per minute (gpm) are assumed as listed in Table A.1 of the CCS Load List calculation. **Technical Justification:** This conservatively maximizes the load on the CCS HX and maximizes the ERCW cooling flow required. This heat load is applied as the minimum acceptance criterion to which the predicted RHR duty under the LAR conditions is compared to demonstrate the available heat transfer margin.	5.12	The maximum RHR HX duty of 54,800,000 Btu/hr (LOCA-RECIRC mode) and design CCS flowrate of 5000 gpm are assumed as listed in Table A.1 of the CCS Load List calculation. **Technical Justification:** This conservatively maximizes the load on the CCS HX and maximizes the ERCW cooling flow required. This heat load is applied as the minimum acceptance criterion to which the predicted RHR duty under the LAR conditions is compared to demonstrate the available heat transfer margin.	None	

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.14	It is assumed that the non-seismic portion of the ERCW piping supplying the station air compressors in the Turbine Building fails and discharges ERCW flow through each 4-inch diameter pipe. **Technical Justification:** The low pressure and high flow control system logic would normally isolate valves 0-FCV-67-0205-A and 0-FCV-67-0208-B. However, for this scenario neither of these valves will be powered and will fail as-is. Assuming both valves wide open provides a conservative loss of ERCW flow in excess of the 350 gpm flow switch setpoint.	5.13	It is assumed that the non-seismic portion of the ERCW piping supplying the station air compressors in the Turbine Building fails and discharges ERCW flow through both 4-inch diameter pipes. **Technical Justification:** The low pressure and high flow control system logic would normally isolate valves 0-FCV-67-0205-A and 0-FCV-67-0208-B. The 67-0205-A valve is powered from the 1A-A SDBD and the 67 0208-B is powered from the 1B-B SDBD. Therefore, neither of these valves will be powered and will fail as-is for a scenario involving LOT A and 1B-B SDBD out of service (e.g., Case 2D1BB). Assuming one or both valves wide open depending on the availability of the respective power source for each case in this analysis, provides a conservative loss of ERCW flow in excess of the 350 gpm flow switch setpoint.	None	Conservatively generalized to dual-unit LAR.

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.15	To account for unidentified system leakage, it is assumed that 100 gpm of ERCW flow is discharged directly from the system. **Technical Justification:** This results in a conservative loss of ERCW flow which is in excess of typical system leakage under normal operating conditions.	5.14	To account for unidentified system leakage, it is assumed that 100 gpm of ERCW flow is discharged directly from the system. **Technical Justification:** This results in a conservative loss of ERCW flow which is in excess of typical system leakage under normal operating conditions.	None	
5.16	ERCW discharge flow is assumed to be directed over the hydraulic gradient rather than the cooling tower basin. **Technical Justification:** This increases the discharge flow resistance and conservatively reduces the flow available to the essential components.	5.15	ERCW discharge flow is assumed to be directed to the hydraulic gradient rather than the cooling tower basin. **Technical Justification:** This increases the discharge flow resistance and conservatively reduces the flow available to the essential components.	None	

Table 1
Analysis Assumptions

Previous LAR		Current LAR		Difference	Basis
5.17	The CCS supplies to the WBN Unit 1 RHR HX and the Non-regen letdown HX are assumed to be isolated. **Technical Justification:** With Unit 1 defueled, there are no heat loads on these heat exchangers, and this preserves CCS flow for the accident unit.	5.16	The CCS supplies to the shutdown unit RHR HX and the Non-regen letdown HX are assumed to be isolated. **Technical Justification:** With the shutdown unit defueled, there are no heat loads on these heat exchangers, and this preserves CCS flow for the accident unit.	None	Generalized to dual-unit LAR.
N/A	N/A	5.17	It is assumed that the CCS heat loads apply to the shutdown and LOCA units independent of which unit is shutdown or which is undergoing post-LOCA conditions. **Technical Justification:** This is confirmed by inspection of the load list tables in the CCS load list calculation.	N/A	This assumption addresses dual unit equivalence and is specific to the current dual unit LAR.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.1	The dual-unit, flow balanced and benchmarked PROTO-FLO base model of the ERCW system is obtained from the ERCW hydraulic model calculation.	3.1	The dual-unit, flow balanced and benchmarked PROTO-FLO base model of the ERCW system is obtained from the ERCW hydraulic model calculation.	None	
3.2	The ERCW system alignments and the ERCW flow rates to the applicable operating equipment are obtained from the ERCW Pressure Drop calculation.	3.2	The ERCW system alignments and the ERCW minimum required flow rates to the applicable operating equipment are obtained from the ERCW Pressure Drop calculation.	None	
3.3	The equipment powered from each shutdown board is extracted from the electrical single line drawings.	3.3	The equipment powered from each shutdown board is extracted from the electrical single line drawings.	None	

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.4	The design data for the new diesel generator jacket water heat exchangers was obtained from the vendor's data sheet included in Appendix 50 of the jacket water heat exchanger performance calculation. The design heat transfer used for this analysis was 7,027,717 BTU/hr.	3.7	The maximum allowable ERCW cooling water temperature for the emergency diesel generator (EDG) jacket water heat exchangers was determined from the jacket water heat exchanger performance calculation, considering the available flow rate predicted herein. The design heat transfer used for this analysis was 6,750,000 BTU/hr.	The subject heat exchanger thermal performance in support of SDBD cleaning is now incorporated in the calculation rather than the SDBD cleaning analysis. The actual acceptance criterion of the EDG jacket water heat exchangers is used, rather than an overly conservative value.	This approach ensures that any subsequent changes to the heat exchanger will be evaluated for impact on the SDBD cleaning analysis. The previous LAR used an overly conservative heat transfer rate. The value of 6,750,000 BTU/hr bounds the actual operating heat load at 110% overload condition.
3.5	The PROTO-FLO/PROTO-HX model of the CCS is taken from Appendix I of the CCS Heat Exchangers Performance calculation.	3.4	The PROTO-FLO/PROTO-HX models of the CCS are taken from Appendix I of the CCS Heat Exchangers Performance calculation.	Both CCS trains A and B are evaluated in the current LAR	Generalized to dual-unit LAR.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.6	The PROTO-HX models of the RHR, SFP, and CCS heat exchangers are obtained from the CCS Heat Exchangers Performance calculation, as follows: • RHR HX – Appendix J • SFP HX – Appendix K • CCS HX – Appendix L	3.5	The PROTO-HX models of the RHR, SFP, and CCS heat exchangers are obtained from the CCS Heat Exchangers Performance calculation, as follows: • RHR HX – Appendix J • SFP HX – Appendix K • CCS HX – Appendix L	None	
3.7	The PROTO-HX model of the CSS heat exchanger is obtained from the CSS HX calculation.	3.6	The PROTO-HX model of the CSS heat exchanger is obtained from the CSS HX calculation.	None	
N/A	N/A (See also 3.13 below)	3.8	The maximum allowable ERCW cooling water temperature for the CSS HX was determined from the CSS HX calculation, considering the available flow rate predicted herein. (See also 3.14 below)	The subject heat exchanger thermal performance in support of SDBD cleaning is now incorporated in the calculation rather than the SDBD cleaning analysis.	This approach ensures that any subsequent changes to the HX will be evaluated for impact on the SDBD cleaning analysis.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.8	The SDBD room chiller condenser energy balance performance spreadsheet is taken from Appendix K-K of the 6.9 kV SDBD room HVAC calculation.	3.9	The maximum allowable ERCW cooling water temperature for the SDBD room chiller condenser is obtained from the SDBR HVAC Equipment Performance calculation, considering the available flow rate predicted herein.	The subject heat exchanger thermal performance in support of SDBD cleaning is now incorporated in the calculation rather than the SDBD cleaning analysis. In addition, the calculation is revised; it was discovered that the calculation did not reflect a retrievable source of design input for certain heat exchanger dimensions. Further, there is a modification in progress to replace the SDBD chiller condensers that may or may not be completed before	This approach is conservative and ensures that any subsequent changes to the heat exchanger will be evaluated for impact on the SDBD cleaning analysis. Impact to the maximum allowable temperature curve from the change in design input was negligible, on the order of 0.5°F to 1.0°F in the flow regime of interest.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
				this LAR (Reference 1) is implemented – the calculation evaluates both cases and chooses the limiting condition.	
3.9	The spreadsheet model of the Main Control Room (MCR) chiller condenser is from Appendix A of the MCR HVAC Equipment Performance calculation.	3.10	The maximum allowable ERCW cooling water temperature for the MCR chiller condenser is obtained from the MCR HVAC Equipment Performance calculation, considering the available flow rate predicted herein.	The subject heat exchanger thermal performance in support of SDBD cleaning is now incorporated in the calculation rather than the SDBD cleaning analysis. In addition, the calculation is revised to reflect a prior re tubing of the MCR chiller condenser. Further, there is a modification in progress to replace the MCR chiller	This approach is conservative, reflects minor station configuration changes, and ensures that any subsequent changes to the heat exchanger will be evaluated for impact on the SDBD cleaning analysis.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
				condensers that may or may not be completed before this LAR (Reference 1) is implemented – the calculation evaluates both cases and chooses the limiting condition.	

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.10	The spreadsheet model of the Electric Board Room (EBR) chiller condenser is from Appendix 13 of the EBR HVAC Equipment Performance calculation.	3.11	The maximum allowable ERCW cooling water temperature for the EBR chiller condenser is obtained from the EBR HVAC Equipment Performance calculation, considering the available flow rate predicted herein.	The subject heat exchanger thermal performance in support of SDBD cleaning is now incorporated in the calculation rather than the SDBD cleaning analysis. In addition, the calculation is revised to reflect a prior re-tubing of the EBR chiller condensers.	This approach reflects minor station configuration changes and ensures that any subsequent changes to the heat exchanger will be evaluated for impact on the SDBD cleaning analysis. Incorporating the retubing effort removed excess margin from the calculation.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.11	The limiting engineering safety feature (ESF) room cooler ERCW inlet temperatures during loss coolant accident (LOCA) conditions as a function of ERCW flow rate are from the "Minimum ESF Cooler ERCW Flow Rates versus Entering ERCW Temperatures during LOCA Conditions" calculation.	3.12	The limiting ESF room cooler ERCW inlet temperatures during LOCA conditions are from the "Minimum ESF Cooler ERCW Flow Rates versus Entering ERCW Temperatures during LOCA Conditions" calculation.	None	
3.12	The limiting heat exchanger outlet temperature limits are obtained from the respective system Op Mode calculations.	3.13	The heat exchanger outlet temperature limits are obtained from the respective system Op Mode calculations.	None	

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.13	The maximum load on the CSS heat exchanger is based on the maximum post-LOCA containment sump temperature of 158.2°F and associated spray flow rate of 4000 gpm consistent with the design basis LOCA analysis.	3.14	The maximum load on the CSS heat exchanger is based on the maximum post-LOCA containment sump temperature of 164.8°F and associated spray flow rate of 4000 gpm consistent with the design basis LOCA analysis.	Previous LAR CSS HX duty = 81,294,921 BTU/hr. Based on design max fouling and 5% tube plugging. Current LAR CSS HX duty = 87,323,731 BTU/hr. Two limits are evaluated and the more conservative is used: 1) minimum required heat transfer credited in the LOCA analysis based on max. sump temperature of 164.8°F, design max. fouling and 10% plugged tubes and 2) maximum allowable ERCW outlet temperature of 130°F based on the sump temperature of	The previous limit of 5% tube plugging was justifiable due to the known CSS HX condition and time limit on the previous LAR, and conservative for purposes of calculating maximum heat transfer. The actual allowable tube plugging limit is 10%. The previous LAR developed the CSS HX acceptance criterion of 81,294,921 BTU/hr based on the maximum post-LOCA containment sump temperature of 158.2°F determined by a Westinghouse

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
				158.2°F, zero fouling and zero plugged tubes.	study in support of increasing the UHS temperature to 88°F. That analysis predicted the CSS HX performance margin of 39%. The current LAR analysis applied the maximum post-LOCA containment sump temperature of 164.8°F from the current LOCA analysis of record (based on the current UHS temperature limit of 85°F) to determine the CSS HX maximum duty acceptance criterion of 87,323,731 BTU/hr. This analysis demonstrates CSS

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
					HX margins of 24% and 31% for a 1/2 B-B SDBD out of service or for a 1/2 A-A SDBD out of service, respectively. Continued use of a 158.2°F inlet temperature in the current analysis for the exit-temperature-limited case is justified in the CSS calculation.
3.14	The maximum LOCA unit RHR heat exchanger duty is based on the maximum RHR temperature of 166.2°F and RHR flow rate of 3100 gpm from the CCS HX Performance calculation.	3.15	The maximum LOCA unit RHR heat exchanger duty is based on the maximum RHR temperature of 166.2°F and RHR flow rate of 3100 gpm from the CCS HX Performance calculation.	None	

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
3.15	The pressure switch setpoint for 0-PS-67-206 and 209 of 37 psig is obtained from the applicable Nuclear Engineering Setpoint Scaling Document (NESSD).	3.16	The pressure switch setpoint for 0-PS-67-206 and 209 of 37 psig is obtained from the applicable NESSD.	None	
3.16	The flow indicating switch setpoint of 350 gpm for 0-FIS-67-206 and 209 is obtained from the applicable NESSD.	3.17	The flow indicating switch setpoint of 350 gpm for 0-FIS-67-206 and 209 is obtained from the applicable NESSD.	None	
N/A	N/A	3.18	The CCS flow rates delivered to the RHR and SFP heat exchangers by the single 1B-B pump for the SDBD 2B-B out of service (OOS) case are obtained from the CCS Pressure Drop calculation.	N/A	This design input is specific to the current LAR.

Table 2
Design Input

Previous LAR		Current LAR		Difference	Basis
N/A	A/B Train CCS (HX) Duty = 106,183,506 BTU/hr.	N/A	A/B Train –CCS HX Duty = 88,764,506 BTU/hr.	A conservative and beyond design basis SFP duty of 50,215,000 BTU/hr for the shutdown unit was added to LOCA unit duty in the previous LAR analysis. The correct value is 88,764,506 BTU/hr.	The predicted CCS HX duty exceeds the overly conservative acceptance criterion in the previous LAR as well as the correct value in the current LAR.