



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-086

May 31, 2016

10 CFR 50.90

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

Sequoyah Nuclear Plant, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 328

Subject: **Response to Request For Additional Information (RAI) Technical Specifications (TS) 3.7.8 Change – Essential Raw Cooling Water (ERCW) System (TAC Nos. MF7450 And MF7451)**

- References:
1. Letter from TVA to NRC, CNL-16-011, "Sequoyah Nuclear Plant, Units 1 and 2, Proposed Technical Specification Change to Extend the Allowed Completion Time to Restore Essential Raw Cooling Water System Train to OPERABLE Status from 72 hours to 7 days (TS-SQN-16-01)," dated March 11, 2016
  2. Email from NRC to TVA, "Request For Additional Information Sequoyah Nuclear Plant, Units 1 and 2, TS) 3.7.8 ERCW Change to Support Shutdown Board Maintenance, (TAC No. MF7450 and MF7451)," dated April 28, 2016

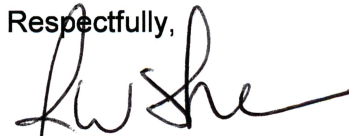
By the Reference 1 letter, Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) to revise Technical Specification (TS) 3.7.8 to Extend the Allowed Completion Time to Restore Essential Raw Cooling Water System Train to OPERABLE Status from 72 hours to 7 days for Sequoyah Nuclear Plant (SQN) Units 1 and 2. In Reference 2, the NRC provided a Request for Additional Information (RAI) related to the proposed change to TS 3.7.8. The due date for the response to the NRC RAI provided by the Reference 2 letter is May 31, 2016. The enclosure to this letter provides the response to the RAI included in the Reference 2 letter.

TVA has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the NRC in the Reference 1 letter. The supplemental information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. In addition, the supplemental information in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed license amendment. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter to the Alabama State Department of Public Health.

There are no new regulatory commitments associated with this submittal. If there are any questions or if additional information is needed, please contact Mr. Edward D. Schrull at (423) 751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31st day of May 2016.

Respectfully,



J. W. Shea  
Vice President, Nuclear Licensing

Enclosure:     Response to NRC Request for Additional Information

cc: (w/ Enclosure)

NRC Regional Administrator - Region II  
NRC Senior Resident Inspector - Sequoyah Nuclear Plant  
NRC SQN Project Manager

**ENCLOSURE**

**Response to NRC Request for Additional Information**

## Enclosure

### Request For Additional Information (RAI) Technical Specifications (TS) 3.7.8 Change – Essential Raw Cooling Water (ERCW) System, (TAC No. MF7450 And MF7451)

Regulatory Bases: 10CFR50 Appendix A - General Design Criteria. Criterion 44  
Cooling Water

#### **RAI SBPB - 1**

##### **Background:**

*The amendment proposes to change TS 3.7.8, "Essential Raw Cooling Water (ERCW) System," to extend the allowed completion time to restore one ERCW System train to OPERABLE status from 72 hours to 7 days for planned maintenance for SQN. These changes are needed to facilitate cleaning and inspection of the 6.9 kilovolt (kV) shutdown boards and associated 480 Volt (V) shutdown boards without requiring a dual unit shutdown.*

*However, the amendment does not clearly state whether physical plant modifications are needed as part of this TS 3.7.8 change.*

##### **RAI:**

*Please confirm if plant modification(s) are needed as part of the proposed TS 3.7.8 change and describe the details of those plant modification(s).*

##### **TVA Response:**

There are no physical plant modifications required to implement this change.

#### **RAI SBPB- 2**

##### **Background:**

*The amendment proposes to change TS 3.7.8, "Essential Raw Cooling Water (ERCW) System," to extend the allowed completion time to restore one ERCW System train to OPERABLE status from 72 hours to 7 days for planned maintenance for SQN. These changes are needed to facilitate cleaning and inspection of the 6.9 kilovolt (kV) shutdown boards and associated 480 Volt (V) shutdown boards without requiring a dual unit shutdown.*

*However, during the proposed 7 day TS 3.7.8 LCO with one ERCW train inoperable for planned maintenance, the LAR did not describe defense-in-depth strategies employed by plant operations to minimize challenges to the only remaining operable train during the extended completion time of the inoperable train.*

##### **RAI:**

*Please describe the defense-in-depth strategies on how operable equipment (such as electrical buses, emergency diesel generators, switch yard, emergency pumps, etc.) will be protected from maintenance or inadvertent operations that would challenge plant safety.*

Request For Additional Information (RAI) Technical  
Specifications (TS) 3.7.8 Change – Essential Raw Cooling  
Water (ERCW) System, (TAC No. MF7450 And MF7451)

**TVA Response:**

TVA employs a graded approach to Defense-in-Depth (DID) and Protected Equipment strategies based on the operating status of the affected unit. Because ERCW is a shared system, TVA's response addresses both the outage unit and the operating unit.

For the Outage Unit:

At least once per shift, Control Room Operations completes a Defense-In-Depth (DID) Assessment in accordance with Procedure 1-PI-OPS-000-020.2 (2-PI-OPS-000-022.2), "Operator At The Controls Duty Station Checklists-Modes 5, 6 And De-Fueled." This DID Assessment provides instructions for verifying the status and availability of components required to maintain key safety functions (Reactivity Control, Decay Heat Removal, Containment, RCS Inventory, Power Availability, and Spent Fuel Cooling/Inventory). This assessment includes guidance to ensure Protected Equipment/Systems are identified and protected. Work is screened to ensure that protected components or systems are not jeopardized. Protected components or systems are identified on shift turnover checklist and reviewed during shift turnover meetings and pre-job briefings, as well as through the use of physical or administrative barriers to prevent entry into a given area. Physical barriers may consist of roped off areas, posting signs, and/or placing cover devices with DID tag attached to door knob or breaker compartment handle. When Operations determines that additional barriers are needed, placement of DID placards and tags is documented and maintained.

For the Operating Unit:

Fleet procedure NPG-SPP-07.3.4, "Protected Equipment" provides similar guidance for protecting operating plant equipment in order to minimize the potential for adverse operational events. Due to the duration of the planned board outage (greater than one shift), components will be posted and barricaded as "protected equipment."

**RAI SBPB- 3**

*Background:*

*The amendment proposes to change TS 3.7.8, "Essential Raw Cooling Water (ERCW) System," to extend the allowed completion time to restore one ERCW System train to OPERABLE status from 72 hours to 7 days for planned maintenance for SQN. These changes are needed to facilitate cleaning and inspection of the 6.9 kilovolt (kV) shutdown boards and associated 480 Volt (V) shutdown boards without requiring a dual unit shutdown.*

*The amendment also proposed that for TS 3.7.8 Action A.1, that certain conditions exists and one ERCW system flow is isolated for planned maintenance at the other unit that is shutdown. For example, while Unit 2 is in operation and Unit 1 is defueled or in Mode 6 with refueling cavity > 23 feet (above top of reactor flange) after defueled, the ERCW system design function for Train A can be met with only one running ERCW pump per train, during a Unit 1 cold shutdown, subject to a maximum ERCW supply*

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*temperature of 79° F. The analysis assumptions include that the 1A EDG, 1A CS HX, U1 TDAFW pump, 1A and 1C LCC groups, and 1A IIRC all have no ERCW flow. The analysis also assumed that the yard header, the 16-inch Auxiliary Building header, and the 6-inch ESF header crossties are in service supported by Train A ERCW.*

*The amendment stated a margin of up to 100 gallons per minute (gpm) would not affect the results of the Multiflow analysis.*

*However, the LAR did not state that operational controls are in place to ensure that the valve line-up and other conditions are maintained in the correct state for the 7 day LCO duration.*

#### **RAI:**

1. *Describe if the extensive valve line-ups that support TS 3.7.8 Action A.1, that are described in the proposed Final Safety Analysis Report, insert Page 9.2-10, will be controlled via an Operations Lock-out Program.*
2. *Describe how valve leakage (> 100 gpm) will be tracked for acceptability for the 7 day duration.*
3. *Describe the controls in place to maintain the refueling cavity > 23 feet*
4. *Describe the TS actions required by the station if:*
  - a. *Unacceptable ERCW flow is determined from any closed boundary valves.*
  - b. *UHS temperature exceed 79 °F.*
  - c. *Refueling cavity water level goes lower than 23 feet*

#### **TVA Response:**

1. As discussed with the NRC during the RAI clarification teleconference on April 25, 2016, valve/equipment line-ups are procedurally controlled in accordance with equipment-specific operating procedures.
2. Various groupings of ERCW boundary valves were evaluated, as described in section 3.2.3 of the enclosure to TVA's letter dated March 11, 2016, . Based on a number of criteria including valve classification (i.e., ASME Code Class, Appendix J), valve design, valve size, and operating experience, it is unlikely that any realistic boundary valve leakage would challenge the analytical accuracy of the ERCW system hydraulic model. The 100 gpm value referenced in section 3.2.3 is an unrealistically high value for valve leakage. In accordance with TVA's Corrective Action Program (CAP) and the "Operability Determination Process and Limiting Conditions for Operation Tracking" procedure, an Immediate Determination of Operability (IDO) is required for any identified leakage from a process system, such as ERCW. As described in the

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### Request For Additional Information (RAI) Technical Specifications (TS) 3.7.8 Change – Essential Raw Cooling Water (ERCW) System, (TAC No. MF7450 And MF7451)

referenced procedure, if system operability cannot be ensured via the IDO, additional evaluations may be necessary. If at any time during the Operability Determination Process, a reasonable assumption of operability is not supported, appropriate system-specific TS actions would be taken as necessary.

3. Refueling cavity water level is controlled by TS 3.9.7 and the 0-GO-9, "Refueling Procedure." 0-GO-9 requires the Fuel Handling Supervisor to ensure the Refueling cavity water level is greater than 23 feet above the reactor vessel flange within 2 hours prior to fuel movement per SR 3.9.7.1. If Refueling cavity water level less than 23 feet above the reactor vessel flange, level must be raised prior to moving irradiated fuel. Additionally, SR 3.9.7.1 is performed every 24 hours per the Surveillance Frequency Control Program while fuel movement is in progress.
- 4.a. In accordance with TVA's CAP and the "Operability Determination Process and Limiting Conditions for Operation Tracking" procedure, an IDO is required for any identified leakage from a process system, such as ERCW. As described in the referenced procedure, if system operability cannot be ensured via the IDO, additional evaluations may be necessary.
- 4.b. If the Ultimate Heat Sink (UHS) temperature exceeds 79°F, TS 3.7.8, Required Action A2 could not be completed. Therefore, the station would enter TS 3.7.8, Condition C which would require the operating unit to be in Mode 3 in 6 hours and Mode 5 in 36 hours.
- 4.c. LCO 3.9.6 requires "Two RHR loops to be OPERABLE, and one RHR loop shall be in operation," if the Outage Unit is in MODE 6 with the water level less than 23 feet above the top of reactor vessel flange. In this scenario, the RHR train associated with the affected shutdown board would not be operable. Condition A of TS 3.9.6 would be entered for less than the required number of RHR loops OPERABLE. Required Action A.2 requires Operations to "Immediately" initiate action to establish minimum 23 feet of water above the top of reactor vessel flange.

LCO 3.9.7 requires Refueling cavity water level to be maintained  $\geq 23$  ft above the top of reactor vessel flange, during movement of irradiated fuel assemblies within containment. Condition A of TS 3.9.7 would be entered for Refueling cavity water level not within limit. Required Action A.1 requires Operations to "Immediately" suspend movement of irradiated fuel assemblies within containment.



Request For Additional Information (RAI) Technical  
Specifications (TS) 3.7.8 Change – Essential Raw Cooling  
Water (ERCW) System, (TAC No. MF7450 And MF7451)

**RAI SBPB- 4**

**Background:**

*The amendment proposes to change TS 3.7.8, "Essential Raw Cooling Water (ERCW) System," to extend the allowed completion time to restore one ERCW System train to OPERABLE status from 72 hours to 7 days for planned maintenance for SQN. These changes are needed to facilitate cleaning and inspection of the 6.9 kilovolt (kV) shutdown boards and associated 480 Volt (V) shutdown boards without requiring a dual unit shutdown. The LAR states that current 72 hours is not adequate to safely clean and inspect a shutdown board and perform corrective maintenance, and a 7 day allowance is proposed.*

*However, justification is not clearly provided as to why a 7-day time limit is appropriate.*

**RAI:**

- *Describe in detail the timeline of planned cleaning and maintenance activities. Address any potential repairs that may require extra time.*

**TVA Response:**

Based on the timeline provided below, it will take approximately 69 hours to complete required maintenance activities and restore the 6.9 kV shutdown board. The potential repair activity with the longest duration has been identified as a bus replacement that would require an additional 36 hours.

<b>Shutdown Board Cleaning Timeline</b>		
	<b>Activity</b>	<b>Duration</b>
1	Install Clearance	5 Hours
2	Prerequisite Maintenance Activities	12 Hours
3	As Found Inspections	2 Hours
4	As Found Megger Test	3 Hours
5	Cleaning and Maintenance	26 Hours
6	As Left Megger Test	4 Hours
7	Restoration Maintenance Activities	12 Hours
8	Release Clearance	5 Hours
	Total	69 Hours

**RAI:**

- *Justify why 7 days is needed, as opposed to a shorter timeline, such as 100 hours.*

**TVA Response:**

As discussed above, TVA estimates that the activities associated with the 6.9 kV shutdown boards can be completed in approximately 69 hours with an



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additional 36 hours for contingencies for a total of approximately 4.5 days.  
Seven days provides additional margin for unanticipated repair activities.

#### **RAI:**

- *Clarify in the proposed TS 3.7.8 Condition “A” with a 7 day completion time is for planned electrical bus maintenance only, as stated in the request.*

#### **TVA Response:**

TS 3.7.8 Condition A has been revised to clarify that this condition is for planned Shutdown Board maintenance. Revised mark-ups of TS 3.7.8 are provided as an attachment to this enclosure.

## Attachment

### 3.7 PLANT SYSTEMS

#### 3.7.8 Essential Raw Cooling Water (ERCW) System

LCO 3.7.8 Two ERCW System trains shall be OPERABLE.

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

#### ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>-----NOTES-----</p> <p>1. Only applicable when Unit 2 is defueled or in MODE 6 following defueled with Unit 2 refueling water cavity level <math>\geq</math> 23 ft. above top of reactor vessel flange.</p> <p>2. Only applicable when Ultimate Heat Sink temperature is <math>\leq</math> 79°F</p> <p>-----</p> <p>A. One ERCW System train inoperable for planned Shutdown Board maintenance.</p>	<p>A.1</p> <p>-----NOTES-----</p> <p>1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for emergency diesel generator made inoperable by ERCW System.</p> <p>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 System.</p> <p>-----</p> <p>Restore ERCW System train to OPERABLE status.</p> <p><u>AND</u></p> <p>A.2 Verify Ultimate Heat Sink temperature is <math>\leq</math> 79°F.</p>	<p>7 days</p> <p>1 hour</p> <p><u>AND</u></p> <p>Once every 8 hours thereafter</p>

<p><b>AB.</b> One ERCW System train inoperable for reasons other than Condition A.</p>	<p><b>AB.1</b> -----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for emergency diesel generator made inoperable by ERCW System.</li> <li>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 System.</li> </ol> <p>-----</p> <p>Restore ERCW System train to OPERABLE status.</p>	<p>72 hours</p>
<p><b>BC.</b> Required Action and associated Completion Time of Condition A or B not met.</p>	<p><b>BC.1</b> Be in MODE 3.</p> <p><u>AND</u></p> <p><b>BC.2</b> Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>

**SURVEILLANCE REQUIREMENTS**

SURVEILLANCE		FREQUENCY
SR 3.7.8.1	<p>-----NOTE----- Isolation of ERCW System flow to individual components does not render the ERCW System inoperable. -----</p> <p>Verify each ERCW System 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.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.7.8.2	Verify each ERCW System automatic valve in the flow path servicing safety related equipment 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 System 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 System trains shall be OPERABLE.

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

#### ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>-----NOTES-----</p> <p>1. Only applicable when Unit 1 is defueled or in MODE 6 following defueled with Unit 1 refueling water cavity level <math>\geq</math> 23 ft. above top of reactor vessel flange.</p> <p>2. Only applicable when Ultimate Heat Sink temperature is <math>\leq</math> 79°F</p> <p>-----</p> <p>A. One ERCW System train inoperable for planned Shutdown Board maintenance.</p> <p>.</p>	<p>A.1</p> <p>-----NOTES-----</p> <p>1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for emergency diesel generator made inoperable by ERCW System.</p> <p>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 System.</p> <p>-----</p> <p>Restore ERCW System train to OPERABLE status.</p> <p><u>AND</u></p> <p>A.2 Verify Ultimate Heat Sink temperature is <math>\leq</math> 79°F</p>	<p>7 days</p> <p><u>AND</u></p> <p>1 hour</p> <p><u>AND</u></p> <p>Once per 8 hours thereafter</p>

<p><b>AB.</b> One ERCW System train inoperable for reasons other than Condition A.</p>	<p><b>AB.1</b> -----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources - Operating," for emergency diesel generator made inoperable by ERCW System.</li> <li>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 System.</li> </ol> <p>-----</p> <p>Restore ERCW System train to OPERABLE status.</p>	<p>72 hours</p>
<p><b>BC.</b> Required Action and associated Completion Time of Condition A or B not met.</p>	<p><b>BC.1</b> Be in MODE 3.</p> <p><u>AND</u></p> <p><b>BC.2</b> Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>



**SURVEILLANCE REQUIREMENTS**

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