



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

January 28, 2010

Mr. R. M. Krich  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 – ISSUANCE OF AMENDMENTS REGARDING THE UPGRADE OF EMERGENCY CORE COOLING SYSTEM REQUIREMENTS PER NUREG-1431 (TS 07-05) (TAC NOS. ME1115 AND ME1116)

Dear Mr. Krich:

The Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 326 to Facility Operating License No. DPR-77 and Amendment No. 319 to Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plant, Units 1 and 2, respectively. These amendments are in response to your application dated April 21, 2009, as supplemented by letters dated September 8 and October 9, 2009, and January 26, 2010.

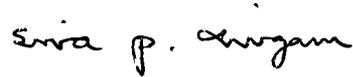
These amendments revise the Sequoyah Nuclear Plant, Units 1 and 2 (SQN) Technical Specifications (TSs), and upgrade the Emergency Core Cooling System (ECCS) requirements to be more consistent with NUREG-1431, Revision 3, "Standard Technical Specifications – Westinghouse Plants." The upgrade revises SQN TS Section 3/4.5.2, "ECCS Subsystems –  $T_{avg}$  Greater Than or Equal to 350 °F," TS Section 3/4.5.3, "ECCS Subsystems –  $T_{avg}$  Less Than 350 °F," and the corresponding surveillance requirements (SRs) that will resolve an inconsistency between SR 4.5.2.f and plant safety analyses.

R. Krich

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A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,



Siva P. Lingam, Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosures: 1. Amendment No. 326 to  
License No. DPR-77  
2. Amendment No. 319 to  
License No. DPR-79  
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-327

SEQUOYAH NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 326  
License No. DPR-77

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated April 21, 2009, as supplemented by letters dated September 8, 2009, October 9, 2009, and January 26, 2010, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 326 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance, to be implemented no later than 60 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Thomas H. Boyce, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to License No. DPR-77  
and the Technical Specifications

Date of Issuance: January 28, 2010

ATTACHMENT TO LICENSE AMENDMENT NO. 326

FACILITY OPERATING LICENSE NO. DPR-77

DOCKET NO. 50-327

Replace Page 3 of Operating License DPR-77 with the attached page.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

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## EMERGENCY CORE COOLING SYSTEMS (ECCS)

### 3/4.5.2 ECCS - OPERATING

#### LIMITING CONDITION FOR OPERATION

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3.5.2 Two ECCS trains shall be OPERABLE.

-----NOTES-----

1. In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 4.4.6.3.
  2. In MODE 3, ECCS pumps may be made incapable of injecting to support transition into or from the APPLICABILITY of LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for up to 4 hours or until the temperature of all RCS cold legs exceeds LTOP arming temperature (350°F) specified in the PTLR plus 25°F, whichever comes first.
- 

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

- a. With one or more trains inoperable and with at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, restore the inoperable train(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
- b. With less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, immediately enter LCO 3.0.3.

#### SURVEILLANCE REQUIREMENTS

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4.5.2 Each ECCS train shall be demonstrated OPERABLE:

- a. At least once per 12 hours by verifying that the following valves are in the indicated positions with power to the valve operators removed:

EMERGENCY CORE COOLING SYSTEMS (ECCS)

SURVEILLANCE REQUIREMENTS (Continued)

- | <u>Valve Number</u> | <u>Valve Function</u>          | <u>Valve Position</u> |
|---------------------|--------------------------------|-----------------------|
| a. FCV-63-1         | RHR Suction from RWST          | open                  |
| b. FCV-63-22        | SIS Discharge to Common Piping | open                  |
- b. At least once per 31 days by:
1. Verify ECCS piping is full of water by venting the ECCS pump casings and accessible piping high points, and
  2. Verify each ECCS manual, power operated and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position.
- c. Deleted
- d. At least once per 18 months perform a visual inspection of the containment sump and verify that the suction inlets are not restricted by debris and that the sump components (strainers, screens, etc.) show no evidence of structural distress or corrosion.
- e. At least once per 18 months, by:
1. Verifying that each automatic valve in the flow path that is not locked, sealed or otherwise secured in position, actuates to its correct position on an actual or simulated actuation signal.
  2. Verifying that each ECCS pump starts automatically on an actual or simulated actuation signal.
- f. By verifying that each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head when tested in accordance with the Inservice Testing Program of Specification 4.0.5.
- g. At least once per 18 months, verify the correct position of each mechanical stop for the following ECCS throttle valves:

<u>Charging Pump Injection Throttle Valves</u>	<u>Safety Injection Cold Leg Throttle Valves</u>	<u>Safety Injection Hot Leg Throttle Valves</u>
<u>Valve Number</u>	<u>Valve Number</u>	<u>Valve Number</u>
1. 63 - 582	1. 63 - 550	1. 63-542
2. 63 - 583	2. 63 - 552	2. 63-544
3. 63 - 584	3. 63 - 554	3. 63-546
4. 63 - 585	4. 63 - 556	4. 63-548

## EMERGENCY CORE COOLING SYSTEMS (ECCS)

### 3/4.5.3 ECCS -SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

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3.5.3 One ECCS train shall be OPERABLE.

-----NOTE-----

An RHR train may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned to the ECCS mode of operation.

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APPLICABILITY: MODE 4.

ACTION:

-----NOTE-----

1. LCO 3.0.4b is not applicable to ECCS centrifugal charging subsystem.
  2. The required ECCS residual heat removal (RHR) subsystem may be inoperable for up to 1 hour for surveillance testing of valves provided that alternate heat removal methods are available via the steam generators to maintain reactor coolant system  $T_{avg}$  less than 350°F and provided that the required subsystem is capable of being manually realigned to the ECCS mode of operation.
    - a. With the required ECCS residual heat removal (RHR) subsystem inoperable, immediately initiate action to restore required ECCS RHR subsystem to OPERABLE status.
    - b. With the required ECCS centrifugal charging subsystem inoperable, within one hour, restore required ECCS centrifugal charging subsystem to OPERABLE status, or be in COLD SHUTDOWN within 24 hours.
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#### SURVEILLANCE REQUIREMENTS

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4.5.3 The ECCS train shall be demonstrated OPERABLE per the following applicable Surveillance Requirements of 4.5.2:

- SR 4.5.2.b.1
- SR 4.5.2.d
- SR 4.5.2.f
- SR 4.5.2.g

EMERGENCY CORE COOLING SYSTEMS (ECCS)

3/4.5.4 DELETED

LIMITING CONDITION FOR OPERATION

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This Specification is deleted.

EMERGENCY CORE COOLING SYSTEMS (ECCS)

3/4.5.5 REFUELING WATER STORAGE TANK

LIMITING CONDITION FOR OPERATION

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3.5.5 The refueling water storage tank (RWST) shall be OPERABLE with:

- a. A contained borated water volume of between 370,000 and 375,000 gallons,
- b. A boron concentration in accordance with the requirements below,

<u>Number of TPBARs#</u>	<u>Minimum Boron</u>	<u>Maximum Boron</u>
0	2500 ppm	3800 ppm
1-250	2800 ppm	3800 ppm
251-500	3000 ppm	3800 ppm
501-1000	3300 ppm	3800 ppm
1001-2256	3600 ppm	3800 ppm

- c. A minimum solution temperature of 60°F, and
- d. A maximum solution temperature of 105°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the RWST inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

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4.5.5 The RWST shall be demonstrated OPERABLE:

- a. At least once per 7 days by:
  - 1. Verifying the contained borated water volume in the tank, and
  - 2. Verifying the boron concentration of the water.
- b. At least once per 24 hours by verifying the RWST temperature.

# The number of TPBARs in the reactor core is contained in the COLR for each fuel cycle.

## EMERGENCY CORE COOLING SYSTEMS (ECCS)

### 3/4.5.6 SEAL INJECTION FLOW

#### LIMITING CONDITION FOR OPERATION

---

3.5.6 Reactor coolant pump seal injection flow shall be within the limits of Figure 3.5.6-1.

APPLICABILITY: MODES 1, 2, and 3.

#### ACTION:

With reactor coolant pump seal injection flow not within limits, adjust manual seal injection throttle valves to give a flow within limit in accordance with Surveillance Requirement 4.5.6 within 4 hours. Otherwise, be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

#### SURVEILLANCE REQUIREMENTS

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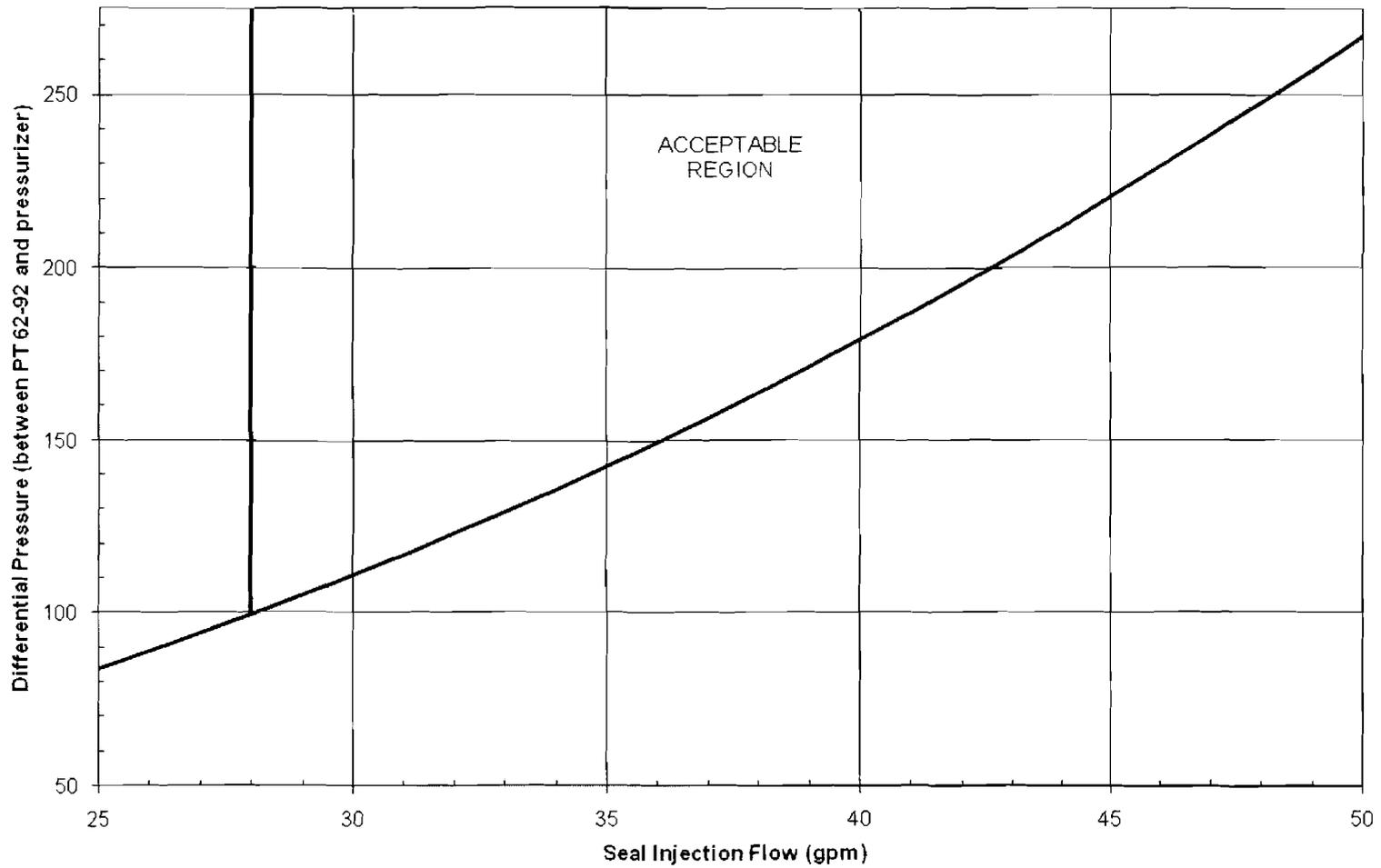
4.5.6 At least once per 31 days\* verify manual seal injection throttle valves are adjusted to give a flow within the emergency core cooling system safety analysis limits in Figure 3.5.6-1.

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\*This surveillance is not required to be performed until 4 hours after the reactor coolant system pressure stabilizes at  $\geq 2215$  psig and  $\leq 2255$  psig.

FIGURE 3.5.6-1

**Seal Injection Flow Limits**





UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-328

SEQUOYAH NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 319  
License No. DPR-79

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated April 21, 2009, as supplemented by letters dated September 8, 2009, October 9, 2009, and January 26, 2010, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-79 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 319 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance, to be implemented no later than 60 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Thomas H. Boyce, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to License No. DPR-79  
and the Technical Specifications

Date of Issuance: January 28, 2010

ATTACHMENT TO LICENSE AMENDMENT NO. 319

FACILITY OPERATING LICENSE NO. DPR-79

DOCKET NO. 50-328

Replace Page 3 of Operating License DPR-79 with the attached page.

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

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EMERGENCY CORE COOLING SYSTEMS

3/4.5.2 ECCS - OPERATING

LIMITING CONDITION FOR OPERATION

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3.5.2 Two ECCS trains shall be OPERABLE.

-----NOTES-----

1. In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 4.4.6.3.
  2. In MODE 3, ECCS pumps may be made incapable of injecting to support transition into or from the APPLICABILITY of LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for up to 4 hours or until the temperature of all RCS cold legs exceeds LTOP arming temperature (350°F) specified in the PTLR plus 25°F, whichever comes first.
- 

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

- a. With one or more trains inoperable and with at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, restore the inoperable train(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
- b. With less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, immediately enter LCO 3.0.3.

SURVEILLANCE REQUIREMENTS

---

4.5.2 Each ECCS train shall be demonstrated OPERABLE:

- a. At least once per 12 hours by verifying that the following valves are in the indicated positions with power to the valve operators removed:

<u>Valve Number</u>	<u>Valve Function</u>	<u>Valve Position</u>
a. FCV-63-1	RHR Suction from RWST	open
b. FCV-63-22	SIS Discharge to Common Piping	open

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- b. At least once per 31 days by:
  - 1. Verify ECCS piping is full of water by venting the ECCS pump casings and accessible piping high points, and
  - 2. Verify each ECCS manual, power operated and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position.
- c. Deleted
- d. At least once per 18 months perform a visual inspection of the containment sump and verify that the suction inlets are not restricted by debris and that the sump components (strainers, screens, etc.) show no evidence of structural distress or corrosion.
- e. At least once per 18 months, by:
  - 1. Verifying that each automatic valve in the flow path that is not locked, sealed or otherwise secured in position, actuates to its correct position on an actual or simulated actuation signal.
  - 2. Verifying that each ECCS pump starts automatically on an actual or simulated actuation signal.
- f. By verifying that each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head when tested in accordance with the Inservice Testing Program of Specification 4.0.5.
- g. At least once per 18 months, verify the correct position of each mechanical stop for the following ECCS throttle valves:

<u>Charging Pump Injection Throttle Valves</u>	<u>Safety Injection Cold Leg Throttle Valves</u>	<u>Safety Injection Hot Leg Throttle Valves</u>
<u>Valve Number</u>	<u>Valve Number</u>	<u>Valve Number</u>
1. 63 - 582	1. 63 - 550	1. 63-542
2. 63 - 583	2. 63 - 552	2. 63-544
3. 63 - 584	3. 63 - 554	3. 63-546
4. 63 - 585	4. 63 - 556	4. 63-548

## EMERGENCY CORE COOLING SYSTEMS

### 3/4.5.3 ECCS -SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

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3.5.3 One ECCS train shall be OPERABLE.

-----NOTE-----

An RHR train may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned to the ECCS mode of operation.

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APPLICABILITY: MODE 4.

ACTION:

-----NOTE-----

1. LCO 3.0.4b is not applicable to ECCS centrifugal charging subsystem.
  2. The required ECCS residual heat removal (RHR) subsystem may be inoperable for up to 1 hour for surveillance testing of valves provided that alternate heat removal methods are available via the steam generators to maintain reactor coolant system  $T_{avg}$  less than 350°F and provided that the required subsystem is capable of being manually realigned to the ECCS mode of operation.
    - a. With the required ECCS residual heat removal (RHR) subsystem inoperable, immediately initiate action to restore required ECCS RHR subsystem to OPERABLE status.
    - b. With the required ECCS centrifugal charging subsystem inoperable, within one hour, restore required ECCS centrifugal charging subsystem to OPERABLE status, or be in COLD SHUTDOWN within 24 hours.
- 

#### SURVEILLANCE REQUIREMENTS

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4.5.3 The ECCS train shall be demonstrated OPERABLE per the following applicable Surveillance Requirements of 4.5.2:

- SR 4.5.2.b.1
- SR 4.5.2.d
- SR 4.5.2.f
- SR 4.5.2.g

EMERGENCY CORE COOLING SYSTEMS

3/4.5.4 DELETED

LIMITING CONDITION FOR OPERATION

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This Specification is deleted.

## EMERGENCY CORE COOLING SYSTEMS

### 3/4.5.5 REFUELING WATER STORAGE TANK

#### LIMITING CONDITION FOR OPERATION

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3.5.5 The refueling water storage tank (RWST) shall be OPERABLE with:

- a. A contained borated water volume of between 370,000 and 375,000 gallons,
- b. A boron concentration in accordance with the requirements below,

<u>Number of TPBARs#</u>	<u>Minimum Boron</u>	<u>Maximum Boron</u>
0	2500 ppm	3800 ppm
1-250	2800 ppm	3800 ppm
251-500	3000 ppm	3800 ppm
501-1000	3300 ppm	3800 ppm
1001-2256	3600 ppm	3800 ppm

- c. A minimum solution temperature of 60°F, and
- d. A maximum solution temperature of 105°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the RWST inoperable, restore the tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

#### SURVEILLANCE REQUIREMENTS

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4.5.5 The RWST shall be demonstrated OPERABLE:

- a. At least once per 7 days by:
  1. Verifying the contained borated water volume in the tank, and
  2. Verifying the boron concentration of the water.
- b. At least once per 24 hours by verifying the RWST temperature.

# The number of TPBARs in the reactor core is contained in the COLR for each fuel cycle.

## EMERGENCY CORE COOLING SYSTEMS (ECCS)

### 3/4.5.6 SEAL INJECTION FLOW

#### LIMITING CONDITION FOR OPERATION

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3.5.6 Reactor coolant pump seal injection flow shall be within the limits of Figure 3.5.6-1.

APPLICABILITY: MODES 1, 2, and 3.

#### ACTION:

With reactor coolant pump seal injection flow not within limits, adjust manual seal injection throttle valves to give a flow within limit in accordance with Surveillance Requirement 4.5.6 within 4 hours. Otherwise, be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

#### SURVEILLANCE REQUIREMENTS

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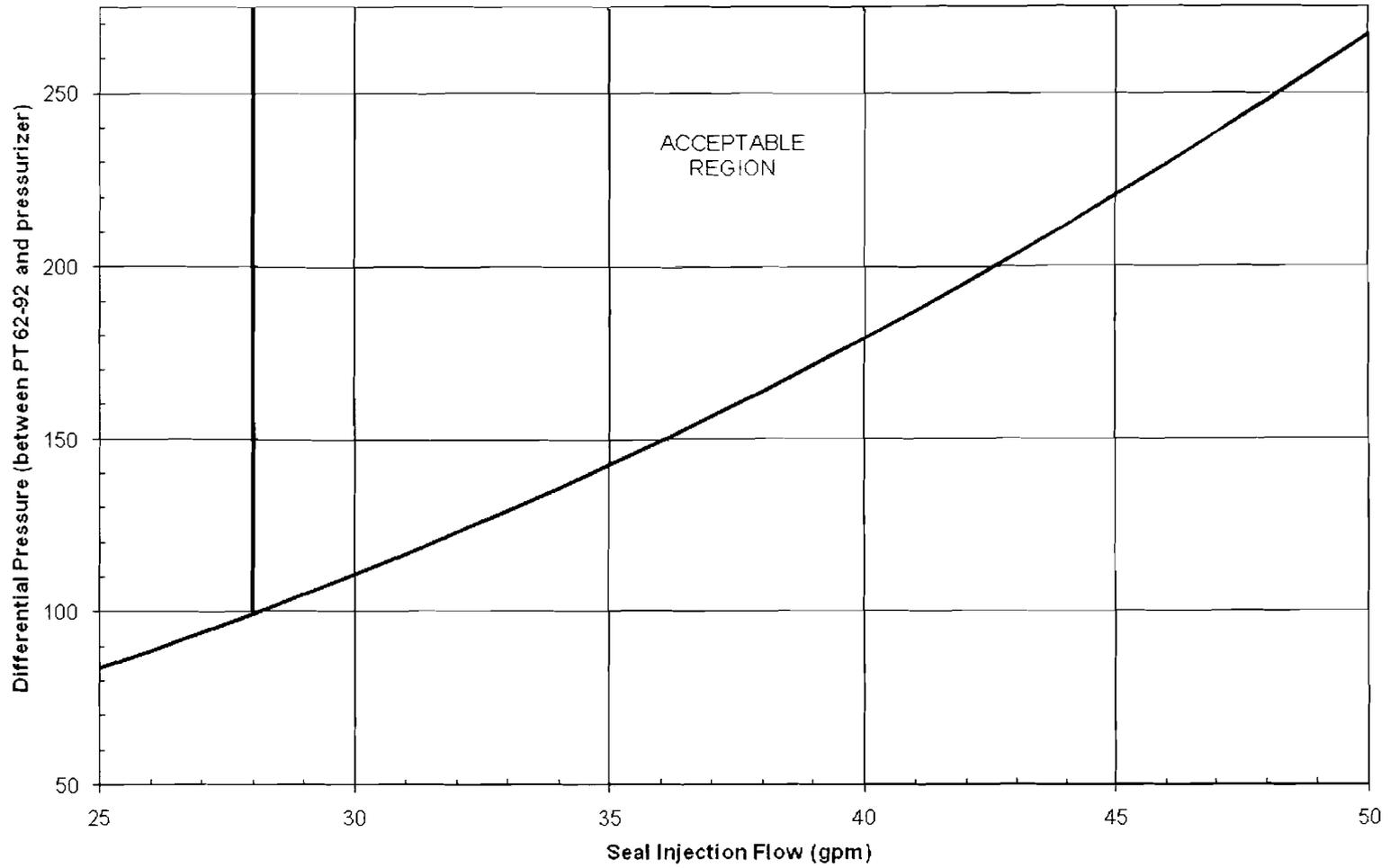
4.5.6 At least once per 31 days\* verify manual seal injection throttle valves are adjusted to give a flow within the emergency core cooling system safety analysis limits in Figure 3.5.6-1.

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\* This surveillance is not required to be performed until 4 hours after the reactor coolant system pressure stabilizes at  $\geq 2215$  psig and  $\leq 2255$  psig.

FIGURE 3.5.6-1

**Seal Injection Flow Limits**





UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 326 TO FACILITY OPERATING LICENSE NO. DPR-77  
AND AMENDMENT NO. 319 TO FACILITY OPERATING LICENSE NO. DPR-79  
TENNESSEE VALLEY AUTHORITY  
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2  
DOCKET NOS. 50-327 AND 50-328

1.0 INTRODUCTION

By application dated April 21, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML091120193), as supplemented by letters dated September 8, 2009 (ADAMS Accession No. ML092530721), October 9, 2009 (ADAMS Accession No. ML092960240), and January 26, 2010, the Tennessee Valley Authority (the licensee) proposed amendments to the Technical Specifications (TSs) for Sequoyah Nuclear Plant (SQN), Units 1 and 2. The requested changes would revise the SQN, Units 1 and 2 TSs, and revise the Emergency Core Cooling System (ECCS) requirements to be more consistent with NUREG-1431, Revision 3, "Standard Technical Specifications – Westinghouse Plants." The revision changes SQN TS Section 3/4.5.2, "ECCS Subsystems –  $T_{avg}$  Greater Than or Equal to 350 °F," TS Section 3/4.5.3, "ECCS Subsystems –  $T_{avg}$  Less Than 350 °F," and the corresponding surveillance requirements (SRs) that will resolve a nonconforming condition associated with SR 4.5.2.f. In general, the proposed conversion provides TS improvements to SQN's current TSs and updates the current requirements to be consistent with the Standard Technical Specifications (STS).

The proposed revision also resolves a nonconforming condition associated with SR 4.5.2.f. SR 4.5.2.f contains specific pump discharge pressure requirements for ECCS quarterly minimum flow recirculation testing, and the discharge pressure values for the safety injection pumps and the centrifugal charging pumps. These test requirements are not conservative to ensure that the performance of the ECCS pumps is consistent with the minimum performance credited by the plant safety analyses and American Society of Mechanical Engineers (ASME) Section XI test criteria. Although current SR 4.5.2.f requirements are nonconservative, surveillance testing of the ECCS pumps is currently performed in accordance with ASME Section XI inservice inspection requirements as required by TS 4.0.5, which ensured that the pumps would perform in accordance with the plant safety analyses. The inservice inspection program testing acceptance criteria are based on the more rigorous performance requirements, are consistent with the plant safety analyses, and exceeded the requirements required by SR 4.5.2.f. Compliance with the inservice testing criteria ensures that the safety analyses minimum performance requirements are met. The proposed change will resolve this nonconforming condition.

The supplemental letters dated September 8 and October 9, 2009, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC or the Commission) staff's initial proposed no significant hazards consideration determination as published in the *Federal Register* on June 16, 2009 (74 FR 28580).

## 2.0 REGULATORY EVALUATION

The proposed change standardizes the existing requirements for SQN's ECCS consistent with the STS. Regulatory requirements associated with SQN's ECCS are based on Section 50.46 of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, and General Design Criteria (GDC) 35 of Appendix A from 10 CFR Part 50.

The NRC's acceptance criteria for a design basis loss-of-coolant accident (LOCA) are based on (1) 10 CFR 50.46, which establishes standards for the calculation of ECCS performance and acceptance criteria for that calculated performance; (2) 10 CFR Part 50, Appendix K, which establishes required and acceptable features of evaluation models for heat removal by the ECCS after the blowdown phase of a LOCA; and (3) GDC-35, which requires that a system to provide abundant emergency core cooling be provided to transfer heat from the reactor core following any LOCA at a rate so that fuel clad damage that could interfere with continued effective core cooling will be prevented.

Section 50.36 of 10 CFR Part 50 contains the requirements for the content of the TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five categories: (1) safety limits (SLs), limiting safety system settings (LSSSs), and limiting control settings; (2) limiting conditions for operation (LCOs); (3) Surveillance Requirements (SRs); (4) design features; and (5) administrative controls.

Section 50.36(c)(2)(ii) of 10 CFR Part 50 lists the criteria used to determine whether or not LCOs must be established in the TSs for items related to plant operation. If the item falls in to one of the four categories below, an LCO must be established in the TSs to ensure the lowest functional capability or performance level of equipment required for safe operation of the facility will be met. The four criteria are:

- Criterion 1      Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.
  
- Criterion 2      A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
  
- Criterion 3      A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

- Criterion 4     A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

For items not meeting one of the above criteria, a TS LCO is not required. Some TS LCOs in plant-specific TSs do not meet any of the 4 criteria outlined above. This is due to the fact that the Commission's policy on TSs has evolved over the years and some licensees have chosen to maintain their TSs content even if it is no longer required. Section 50.36 of 10 CFR Part 50 does not specify each particular requirement to be included in a plant's TSs, nor does it specify the format of a plant's TSs. Rather, the NRC publishes generic guidance on TSs format and content.

The NRC published a set of Standard Technical Specifications (STS) in NUREG-1431, Revision 3 "Standard Technical Specifications, Westinghouse Plants." The STS are a guide to what a plant's TSs should contain with regard to format and content. The STS are not requirements in a regulatory sense, but licensees adopting portions of the improved STS to existing technical specifications should adopt all related requirements, as applicable, to achieve a high degree of standardization and consistency.

The NRC staff reviewed the proposed changes for compliance with 10 CFR 50.36 and agreement with the guidance in NUREG-1431. In general, licensees cannot justify technical specification changes solely on the basis of adopting the model STS. To ensure proper adoption of the model STS, the NRC staff makes a determination that proposed changes maintain adequate safety. Changes that result in relaxation (less restrictive condition) of current TS requirements require detailed justification that adequate safety will be maintained.

In general, there are two classes of changes to TSs: (1) changes needed to reflect contents of the design basis (technical specifications are derived from the design basis), and (2) voluntary changes to take advantage of the evolution in policy and guidance as to the required content and preferred format of TSs over time. This amendment deals with the first class of change, namely, the removal of the nonconservative pump testing criteria and TSs content not contained in the latest version of NUREG-1431.

Licensees may propose revisions to the TSs to adopt improved standard technical specification format and content provided that plant-specific review supports a finding of continued adequate safety because: (1) the change is editorial, administrative or provides clarification (i.e., no requirements are materially altered), (2) the change is more restrictive than the licensee's current requirement, or (3) the change is less restrictive than the licensee's current requirement, but nonetheless still affords adequate assurance of safety when judged against current regulatory standards. The NRC staff reviews such proposals and decides whether or not to change the licensee's TSs. The detailed application of this general framework, and additional specialized guidance, are discussed in Section 3.0 in the context of specific proposed changes.

The licensee's submittal and responses to the NRC staff's RAI provided sufficient material for the NRC staff to perform the review and evaluate the licensee's request in accordance with the regulatory guidelines. The NRC staff review found that the information submitted by the licensee was consistent with the regulatory requirements.

### 3.0 TECHNICAL EVALUATION

The NRC staff evaluated the proposed TS changes by determining if the proposed TSs continue to meet the requirements of 10 CFR 50.36 and if the proposed TSs are consistent with SQN's current licensing basis. This ensures that the proposed changes will maintain adequate safety because it can be assumed that the current TSs for SQN maintain adequate safety. The proposed changes are categorized as administrative, less restrictive, or more restrictive. Changes to individual TSs can have one or more types of changes in them. Therefore each change will be called out in the applicable section below which discusses the changes in detail.

The NRC staff also compared the proposed TSs to the content of NUREG-1431. Differences between the content of the proposed TSs and the content of NUREG-1431 are also addressed when applicable. Minor differences between NUREG-1431 and plant-specific TSs are expected since each plant has a unique licensing basis that may not be reflected in NRC's generic guidance.

#### 3.1 Changes to TS 3.5.2

The licensee proposed changes to the title, LCO statement, applicability statement, action requirements, and SR's of TS 3.5.2. The proposed changes are described in sections 3.1.1 through 3.1.5.8 below.

##### 3.1.1 Changes to TS 3.5.2 Title

The licensee proposed replacing the current title "ECCS Subsystems –  $T_{avg}$  greater than or equal to 350°F" with the STS title "ECCS – Operating". The NRC staff determined that the proposed change is administrative in nature, because it does not affect existing ECCS requirements or other related specifications. The NRC staff determined that the proposed change to the title is acceptable.

##### 3.1.2 Changes to TS 3.5.2 LCO Statement

The current LCO statement reads as follows:

3.5.2 Two independent ECCS subsystems shall be OPERABLE\* with each subsystem comprised of:

- a. One OPERABLE centrifugal charging pump,
- b. One OPERABLE safety injection pump,
- c. One OPERABLE residual heat removal heat exchanger,
- d. One OPERABLE residual heat removal pump, and
- e. An OPERABLE flow path capable of taking suction from the refueling water storage tank on a safety injection signal and automatically transferring suction to the containment sump during the recirculation phase of operation.

The licensee proposed replacing the current LCO statement with the language used in STS LCO that reads:

3.5.2 Two ECCS trains shall be OPERABLE.

The licensee described the proposed changes to the LCO statement in the following manner:

TVA's proposed change replaces "two independent subsystems" with the STS language "two ECCS trains." In addition, the plant components that are listed in SQN's LCO and comprise a "subsystem" are removed. The description of components is no longer part of the LCO but is relocated to the proposed ECCS TSs Bases section. The components that make up a standard "ECCS train" are described in the LCO section of the STS Bases and comprise the same set of components that currently exist in SQN's LCO. The proposed relocation of the ECCS components and the adoption of the STS language for these components remain consistent with the standard requirements. Accordingly, TVA's proposed change to the LCO provides the appropriate level of detail. Because TS Bases information is a licensee controlled document, the proposed change to the LCO is considered less restrictive.

The notes for LCO 3.5.2 are being revised to be consistent with NUREG-1431. Note 1 is being added to allow for up to 2 hours to perform pressure isolation valve testing per SR 4.4.6.3. This change is considered to be less restrictive. Note 2 adds the (350°F) low temperature overpressure protection (LTOP) arming temperature to the note to be consistent with STS language. This change is considered to be neutral.

The notes are:

1. In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valves for up to 2 hours to perform pressure isolation valve testing per SR 4.4.6.3.
2. In MODE 3, ECCS pumps may be made incapable of injecting to support transition into or from the APPLICABILITY of LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for up to 4 hours or until the temperature of all RCS cold legs exceeds LTOP arming temperature (350°F) specified in the PTLR plus 25°F, whichever comes first.

The NRC staff reviewed the proposed changes to the LCO statement and the licensee's justification for the changes. The NRC staff agrees that movement of component descriptions to the TS Bases is a less restrictive change. However, the licensee has a TS Bases Control Program that requires NRC approval of any changes to the TS Bases that would require a change in the TSs. This program maintains adequate control of changes to information in the TS Base and TSs. The NRC staff determined that the proposed changes are acceptable.

### 3.1.3 Changes to TS 3.5.2 Applicability Statement

The licensee stated that the applicability statement of SQN TS 3.5.2 is equivalent to the STS and thus there is no proposed change in applicability. The NRC staff compared the proposed applicability to that in the STS and found them to be identical. The NRC staff determined that this is acceptable.

### 3.1.4 Changes to TS 3.5.2 Action Requirements

The TS action requirement currently reads as follows:

With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

The licensee proposed replacing the above action with two actions that state:

- a. With one or more trains inoperable, and with at least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, restore the inoperable train(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
- b. With less than 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available, immediately enter LCO 3.0.3.

The licensee described the proposed changes to the action requirements in the following manner:

TVA's proposed change replaces SQN's current single action with two separate standard action requirements. In Action (a), language from SQN's current action (i.e., subsystem) is replaced with standard language (i.e., one or more trains). These changes to the standard requirements provide an improvement in the level of detail over SQN's current action requirement. The change to "one or more trains" expands the application of the action to include additional ECCS trains that may be determined to be inoperable. As ECCS trains involve diverse subsystems with multiple components, there may be different components, each in a different train that may be inoperable; however, the ECCS function is not lost. Consequently, when the ECCS function for a single "OPERABLE ECCS" train is available, an allowed outage time of 72 hours is applied for restoring the inoperable ECCS train. It is this clarification that provides increased flexibility in plant operations when components in opposite trains (i.e., one or more trains) are rendered inoperable. In addition to these changes, Action (a) provides for plant shutdown in the event a single "OPERABLE ECCS" train cannot be rendered operable within the allowed outage time. In the STS, to achieve plant shutdown, the plant must be brought to Mode 3 (Hot Standby) within 6 hours and to Mode 4 (Hot Shutdown) within 12 hours (i.e., the following 6 hours). The standard shutdown time is equivalent to SQN's current shutdown time and is appropriate for the proposed action (a).

TVA's proposed change adds Action (b) that provides measures for immediate entry into LCO 3.0.3 when less than 100 percent of the ECCS flow equivalent to a single "OPERABLE ECCS" train is not available. This action ensures that plant operation does not continue outside the accident analyses. This action provides an improvement over SQN's current action requirements. Accordingly, TVA considers this proposed change to be less restrictive

The NRC staff determined that proposed Actions (a) and (b) were accurately categorized by the licensee as less restrictive than their current TSs. The NRC staff reviewed the proposed changes and the licensee's justification for the changes, and determined that plant operation will not continue outside the accident analysis because the TS Action requirements will make the operators shut the plant down before operation outside the accident analysis occurs. Therefore the proposed changes afford adequate assurance of safety when judged against current regulatory standards. The NRC staff determined that the proposed changes associated with adding Actions (a) and (b) are acceptable.

### 3.1.5 Changes to TS 3.5.2 SRs

#### 3.1.5.1 SR 4.5.2

The current SR 4.5.2 is:

Each ECCS subsystem shall be demonstrated OPERABLE:

- a. At least once per 12 hours by verifying that the following valves are in the indicated positions with power to the valve operators removed:

The licensee proposed replacing the term "subsystem" with the term "train." The licensee stated that the change is editorial in nature because the term "train" is being clearly defined in the TSs Bases section. The NRC staff reviewed the proposed change and the supporting TS Bases section and determined that the TS change is editorial and that the change is acceptable.

#### 3.1.5.2 SR 4.5.2.b

The current SR 4.5.2.b. is:

- b. At least once per 31 days by:
  1. Verifying that the ECCS piping is full of water by venting the ECCS pump casings and accessible discharge piping high points, and
  2. Verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

The licensee proposed changing SR 4.5.2.b to read as follows:

- b. At least once per 31 days by:
  - 1. Verify ECCS piping is full of water by venting the ECCS pump casings and accessible piping high points, and
  - 2. Verify each ECCS manual, power operated and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position.

The licensee's amendment request contained the following explanation for the proposed change:

SQN's existing SR 4.5.2.b provides venting requirements only for ECCS discharge piping and components. TVA is upgrading SQN SR 4.5.2.b to the STS requirements to address the suction piping of ECCS by deleting the word discharge from the SR. Additionally, SR 4.5.2.b.2 is being revised to adopt STS language. Accordingly, TVS considers the addition of this STS language to be an improvement that is neutral.

During the review of the proposed change, the NRC staff requested the licensee to define the phrase "full of water" used in the SR; and to provide a void acceptance criterion applied for SQN, and its basis. The NRC staff also asked for clarification regarding licensee's plan to implement the NRC Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," for SQN, including modification of the TSs and the SRs, to make the plant consistent with the GL requirements related to ECCS voids. The licensee's response indicated that TVA is committed to evaluating and adopting the revised STS at SQN within 6 months of NRC approval of the Technical Specification Task Force (TSTF) Traveler. Therefore, these issues will be addressed as part of the NRC review of the SQN response to GL 2008-01 and subsequent license amendment request dated September 8, 2009. The NRC staff considers the licensee's response as acceptable.

The NRC staff verified that the licensee's response to GL 2008-01 to NRC (ADAMS Accession No. ML082890540) included a commitment to evaluating and adopting the revised STS SR 3.5.2.3 (NUREG-1431) at SQN within six months of NRC approval of the TSTF. This is consistent with the NRC letter to the Nuclear Energy Institute (ADAMS Accession No. ML091390637) that these issues will be addressed as part of the NRC review of plant-specific response to GL 2008-01 and subsequent license amendment request. The NRC staff, therefore, finds the response acceptable.

The NRC staff determined that the proposed change to SR 4.5.2.b is more restrictive, and therefore, the proposed change is acceptable.

### 3.1.5.3 SR 4.5.2.c

The current SR 4.5.2.c is:

- c. By a visual inspection which verifies that no loose debris (rags, trash, clothing, etc.) is present in the containment which could be transported to the containment sump and cause restriction of the pump suctions during LOCA conditions. This visual inspection shall be performed:
  - 1. For all accessible areas of the containment prior to establishing CONTAINMENT INTEGRITY, and
  - 2. Of the areas affected within containment at the action of each containment entry when "CONTAINMENT INTEGRITY" is established.

The licensee proposed relocating this surveillance from SQN TSs to existing plant procedures. The licensee provided justification for the relocation by stating:

The surveillance for performing a visual inspection when establishing containment integrity has been removed from STS. This surveillance is typically controlled in the nuclear industry by plant procedures that establish and maintain containment integrity. Accordingly, this SR is no longer in the STS for ECCS. TVA's proposed change for relocating this SR to existing plant procedures is consistent with the STS and TVA considers this change to be a less restrictive change.

The NRC staff determined that relocating the SR from the TSs to plant procedures results in a relaxation of the TS requirements. Therefore, the NRC staff requested further justification for relocation of the SR items from the TSs to plant procedures. In the licensee's September 8, 2009, response to the request for further justification, the licensee made a commitment to add the requirements of SR 4.5.2.c to the Updated Final Safety Analysis Report (UFSAR) during the update following implementation of the proposed TS change. The NRC staff determined that relocating the SR 4.5.2.c requirements to the UFSAR will provide appropriate regulatory controls for these requirements, since any changes to these requirements will be controlled in accordance with 10 CFR 50.59 and 10 CFR 50.71(e). The NRC staff determined that the proposed relaxation was acceptable based on the above commitments made by the licensee.

### 3.1.5.4 SR 4.5.2.d

The current SR 4.5.2.d is:

- d. At least once per 18 months by:
  - 1. Deleted.
  - 2. A visual inspection of the containment sump and verifying the subsystem suction inlets are not restricted by debris and that the sump components (trash rack, screens, etc.) show no evidence of structural distress or corrosion.

The licensee proposed changing SR 4.5.2.d to read as follows:

- d. At least once per 18 months perform a visual inspection of the containment sump and verify the suction inlets are not restricted by debris and that the sump components (strainers, screens, etc.) show no evidence of structural distress or corrosion.

The licensee provided the following description and justification for the proposed change:

TVA proposes to revise SR 4.5.2.d to incorporate the standard SR for sump inspection. The standard surveillance provides a description of the sump components required to be visually inspected (i.e., trash racks and screens). TVA's proposed change deletes the word subsystem and replaces the term "trash racks" with "strainers." This change in terminology is editorial in nature and reflects recent plant modifications that were performed to install strainers over the opening of SQN's containment sump. SQN's containment sump was originally designed with a mesh screen framework that covered the sump opening. Following issuance of NRC Generic Letter 2004-02, plant modifications were made to replace the screen design with a strainer design.

Note that the term "trash racks" has never been a part of SQN's sump design history. This term was used during SQN's application for full power license and was standard TS language at that time. It may be noted that the term "screen" remains applicable within SR 4.5.2.d because the opening of the ECCS suction inlet piping (located inside the containment sump) is covered with a meshed screen and must be visually inspected. Therefore, TVA considers this change to be neutral.

The NRC staff reviewed the proposed change and the licensee's justification for the change. The NRC staff determined that the change is an administrative change because no requirements are materially altered. Therefore, the NRC staff determined that this change is acceptable.

#### 3.1.5.5 SR 4.5.2.e

The current SR 4.5.2.e is:

- e. At least once per 18 months, during shutdown by:
  1. Verifying that each automatic valve in the flow path actuates to its correct position on a safety injection test signal and automatic switchover to containment sump test signal.
  2. Verifying that each of the following pumps start automatically upon receipt of a safety injection signal:
    - a) Centrifugal charging pump
    - b) Safety injection pump
    - c) Residual heat removal pump

The licensee proposed changing SR 4.5.2.e to read as follows:

- e. At least once per 18 months by:
  - 1. Verifying that each automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to its correct position on an actual or simulated actuation signal.
  - 2. Verifying that each ECCS pump starts automatically on an actual or simulated actuation signal.

The licensee provided the following description and justification for the proposed change:

TVA's proposed change to SR 4.5.2.e adds STS language that provides clarification to SQN's existing SR.

The first proposed change removes the language "during shutdown" from the 18[-]month frequency description. The standard Bases states the reasons for performing surveillances during plant shutdown conditions. Consequently, this level of detail is not necessary for inclusion in the TSs and is removed. Changes to the Bases are controlled in accordance with administrative controls and 10 CFR 50.59 that ensure that any changes are appropriately reviewed. Accordingly, this proposed change is considered less restrictive.

The second proposed change is to SR 4.5.2.e.1 and involves the addition of STS language; "that is not locked, sealed, or otherwise secured." Addition of this phrase is an improvement that defines those ECCS valves in the flow path that must be verified to actuate to their correct post-accident position. In addition, it may be noted that the addition of this phrase provides consistency with other portions of the SQN TSs (i.e., Containment, Section 6.0) that already utilize the standard language. The addition of STS language does not alter the selection of automatic ECCS valves required to be verified by SQN's SR. The population of valves within the flow path remains unchanged. Accordingly, TVA considers the addition of this STS language to be an improvement that is neutral.

The third change provides a revision to SQN SR 4.5.2.e.1 that incorporates STS language associated with the ECCS actuation signal. The STS language verifies that each ECCS automatic valve in the flow path actuates to the correct position on an "actual" or "simulated actuation signal." SQN's SR 4.5.2.e.1 accomplishes actuation of ECCS by initiating a manual safety injection signal. This is accomplished through manual hand switches in the main control room. In conjunction with the safety injection signal, SQN's SR calls for initiation of a containment swap-over signal to verify that certain automatic ECCS valves realign from the refueling water storage tank (RWST) to the containment sump. The containment swap-over signal is initiated by actuation of bistables in the instrument racks that make up the proper logic for initiation of this signal. TVA considers the proposed change to be neutral because the test methodology remains unchanged for the ECCS pumps.

The fourth change provides a revision to SQN SR 4.5.2.e.2 that incorporates STS language associated with the ECCS automatic start and eliminates the pump listing. The proposed modification of the SR does not change the test methodology for the ECCS pumps.

The NRC staff reviewed the licensee's proposed changes and associated justifications. The NRC staff determined that the proposed changes to SR 4.5.2.e are editorial and are therefore acceptable.

### 3.1.5.6 SR 4.5.2.f

The current SQN SR 4.5.2.f states:

- f. By verifying that each of the following pumps develops the indicated discharge pressure on recirculation flow when tested pursuant to Specification 4.0.5:
  - 1. Centrifugal charging pump Greater than or equal to 2400 psig [pounds per square inch gauge]
  - 2. Safety Injection pump Greater than or equal to 1407 psig
  - 3. Residual heat removal pump Greater than or equal to 165 psig

The licensee proposed changing SR 4.5.2.f to read as follows:

- f. By verifying that each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head when tested in accordance with the Inservice Test Program of Specification 4.0.5.

The licensee provided the following description and justification for the proposed change:

TVA's proposed upgrade to SR 4.5.2.f is an improvement that provides consistency with the STS. The proposed change eliminates the listing of ECCS pumps with their associated discharge pressures and the specific requirement to test the ECCS pumps on recirculation flow (miniflow). The proposed change adopts the standard SR for pump testing at the test flow point that is greater than or equal to the required developed head. Pump performance may be verified with more accuracy at the required developed head or at higher flows. As such, TVA's proposed change allows the ASME Inservice Test (IST) Program to determine and specify the test methods and flow(s) required to verify pump performance. Accordingly, the current list of ECCS pumps with their associated discharge pressures is relocated from the TSs to SQN's IST Program as referenced in SQN TS 4.0.5. TVA considers the proposed change to be less restrictive.

On page E-1 of its amendment request, the licensee stated:

SR 4.5.2.f contains specific pump discharge pressure requirements for ECCS quarterly minimum flow recirculation testing. The discharge pressure values for the safety injection pumps and the centrifugal charging pumps are nonconservative to ensure that the performance of the ECCS pumps is consistent with the minimum

performance credited by the plant safety analyses and ASME Section XI test criteria.

The NRC staff requested that the licensee provide an expanded discussion on the minimum pump performance requirements that were credited in SQN safety analyses and the above mentioned nonconservatism in the current SR 4.5.2.f discharge pressure values for the safety injection pumps and the centrifugal charging pumps. The licensee provided the following expanded discussion in its September 8, 2009, response to the request:

SR 4.5.2.f contains specific pump discharge pressure requirements for ECCS quarterly minimum flow recirculation testing. The values contained in the SR for the centrifugal charging and safety injection pumps are not consistent with the ASME Section XI test acceptance criteria for minimum flow recirculation testing in that 1) the values are given in terms of discharge pressure (pounds per square inch gauge) rather than developed pressure (pounds per square inch differential) that nonconservatively includes and credits the static pressure head on the suction side of the pump, and 2) are based on relaxed ECCS minimum safeguards performance requirements that were in place before the removal of the upper head injection system from service at SQN in 1990. As a result of allowable limits provided, the minimum flow test values in SR 4.5.2.f are less demanding in terms of developed pump head than the current ASME Section XI minimum recirculation flow test criteria. As such, it is possible to comply with both the requirements of the ASME Section XI test criteria and the pump discharge pressure criteria of SR 4.5.2. However, only the current ASME Section XI test criteria are adequate to demonstrate compliance with the current minimum safeguards safety analysis requirements.

The minimum ECCS pump performance requirements credited by the SQN safety analyses are summarized in SQN's UFSAR Figure 6.3.2-5, "NPSH and Head Capacity Curves for RHR Pumps," Figure 6.3.2-6, "NPSH and Head Capacity Curves for Safety Injection Pumps," and Figure 6.3.2-7, "NPSH and Head Capacity Curves for Centrifugal Charging Pumps." SQN TS 4.0.5, requires surveillance testing of the ECCS pumps in accordance with the requirements of ASME Section XI Code.

The requirements for pump testing acceptance criteria are in accordance with the ASME Operation and Maintenance (OM) Code. SQN procedures for testing are based on the ASME OM Code. The procedure states that the test ranges used as acceptance criteria shall not exceed the more conservative of the design, technical specification or Code limits. In the case of the SQN ECCS pumps, the minimum safeguards performance values established by the plant safety analyses require a higher pump developed head than the maximum nominal performance degradation allowed by the ASME Code. SQN utilizes the minimum safeguards values for ECCS pump testing (i.e. design requirements) rather than the less conservative Code limits. Compliance with this established test acceptance criteria confirms compliance with the assumed minimum safeguards safety analysis requirements. Therefore, the proposed change ensures continued compliance with the SQN safety analyses.

The NRC staff determined that the proposed change to SR 4.5.2.f is more conservative than the current requirements even though the pump developed head requirements can be moved from the TSs because the current pump discharge requirements under recirculation were non-conforming with the minimum safeguards performance values. The NRC staff reviewed the licensee's assessment and justification for the less restrictive change. The NRC staff concurred that the proposed changes are an improvement that provides consistency with the STS, and afford adequate assurance of safety when judged against current regulatory standards, and therefore, are acceptable.

3.1.5.7 SR 4.5.2.g

The current SR 4.5.2.g is:

- g. By verifying the correct position of each mechanical stop for the following Emergency Core Cooling System throttle valves:
  - 1. Within 4 hours following action of each valve stroking operation or maintenance on the valve when the ECCS subsystems are required to be OPERABLE.
  - 2. At least once per 18 months.

<u>Charging Pump Injection Throttle Valves</u>	<u>Safety Injection Cold Leg Throttle Valves</u>	<u>Safety Injection Hot Leg Throttle Valves</u>
<u>Valve Number</u>	<u>Valve Number</u>	<u>Valve Number</u>
1. 63-582	1. 63-550	1. 63-542
2. 63-583	2. 63-552	2. 63-544
3. 63-584	3. 63-554	3. 63-546
4. 63-585	4. 63-556	4. 63-548

The licensee proposed changing SR 4.5.2.g to read as follows:

- g. At least once per 18 months verify the correct position of each mechanical stop for the following ECCS throttle valves.

<u>Charging Pump Injection Throttle Valves</u>	<u>Safety Injection Cold Leg Throttle Valves</u>	<u>Safety Injection Hot Leg Throttle Valves</u>
<u>Valve Number</u>	<u>Valve Number</u>	<u>Valve Number</u>
1. 63-582	1. 63-550	1. 63-542
2. 63-583	2. 63-552	2. 63-544
3. 63-584	3. 63-554	3. 63-546
4. 63-585	4. 63-556	4. 63-548

The licensee provided the following description and justification for the proposed change:

TVA's proposed change relocates SQN SR 4.5.2.g.1 to plant procedures. The requirement for verifying ECCS throttle valve stop position after valve stroking or maintenance is to be governed by plant procedures consistent with STS. At SQN, the ECCS throttle valves are manual needle valves that are locked in position and do not realign on a safety injection signal. As such, it is sufficient to control these valves via maintenance procedures and the locked valve program. In the STS, post-maintenance test requirements have been removed from the TSs. Plant procedures govern the restoration of plant equipment after maintenance and must specify the appropriate post-maintenance testing. TVA considers this proposed change to be less restrictive

The NRC staff determined that relocating SR 4.5.2.g.1 from the TSs to plant procedures results in a relaxation of the TS requirements. Therefore, the NRC staff requested further justification for relocation of the SR items from the TSs to plant procedures. In the licensee's September 8, 2009, response to the request for further justification, the licensee made a commitment to add the requirements of SR 4.5.2.g.1 to the Updated Final Safety Analysis Report (UFSAR) during the update following implementation of the proposed TS change. The NRC staff determined that relocating the SR 4.5.2.g.1 requirements to the UFSAR will provide appropriate regulatory controls for these requirements, since any changes to these requirements will be controlled in accordance with 10 CFR 50.59 and 10 CFR 50.71(e). The NRC staff determined that the proposed relaxation was acceptable based on the above commitments made by the licensee.

#### 3.1.5.8 SR 4.5.2.h

The current SR 4.5.2.h is:

- h. By performing a flow balance test during shutdown following action of modifications to the ECCS subsystem that alter the subsystem flow characteristics and verifying the following flow rates:
  - 1. For safety injection pump lines with a single pump running:
    - a. The sum of the injection line flow rates, excluding the highest flow rate is greater than or equal to 443 gpm [gallons per minute], and
    - b. The total pump flow rate is less than or equal to 675 gpm.
  - 2. For centrifugal charging pump lines with a single pump running:
    - a. The sum of the injection line flow rates, excluding the highest flow rate is greater than or equal to 309 gpm, and
    - b. The total pump flow rate is less than or equal to 555 gpm.
  - 3. For all four cold leg injection lines with a single RHR pump running a flow rate greater than or equal to 3931 gpm.

The licensee proposed relocating the SR to plant procedures and deleting the SR from TS. The licensee provided the following description and justification for the proposed change:

TVA's proposed change relocates SQN SR 4.5.2.h to plant procedures. The requirement for performing a flow balance test following ECCS modifications is no longer required as part of the STS and is relocated from SQN's TSs. The proposed change is consistent with STS in that post-maintenance testing is more appropriately governed by plant procedures. The restoration of equipment after maintenance is specified by the appropriate post-maintenance test procedure. Accordingly, TVA considers the proposed change to be less restrictive.

The NRC staff determined that relocating SR 4.5.2.h from the TSs to plant procedures results in a relaxation of the TS requirements. Therefore, the NRC staff requested further justification for relocation of the SR items from the TSs to plant procedures. In the licensee's September 8, 2009, response to the request for further justification, the licensee made a commitment to add the requirements of SR 4.5.2.h to the Updated Final Safety Analysis Report (UFSAR) during the update following implementation of the proposed TS change. The NRC staff determined that relocating the SR 4.5.2.h requirements to the UFSAR will provide appropriate regulatory controls for these requirements, since any changes to these requirements will be controlled in accordance with 10 CFR 50.59 and 10 CFR 50.71(e). The NRC staff determined that the proposed relaxation was acceptable based on the above commitments made by the licensee.

### 3.2 Changes to TS 3.5.3

The licensee proposed changes to the title, LCO statement, applicability statement, action requirements, and SR's of TS 3.5.3. The proposed changes are described in sections 3.2.1 through 3.2.5. below.

#### 3.2.1 Changes to TS 3.5.2 Title

The licensee proposed replacing the current title "ECCS Subsystems –  $T_{avg}$  less than 350°F" with the standard title "ECCS – Shutdown". The NRC staff determined that the proposed change is administrative in nature, because it does not affect existing ECCS requirements or other related specifications. The NRC staff determined that the proposed change to the title is acceptable.

#### 3.2.2 Changes to TS 3.5.3 LCO Statement

The current LCO statement reads as follows:

3.5.3 As a minimum one ECCS subsystem comprised of the following shall be OPERABLE:

- a. One OPERABLE centrifugal charging pump,
- b. One OPERABLE residual heat removal heat exchanger,
- c. One OPERABLE residual heat removal pump, and
- d. An OPERABLE flow path capable of taking suction from the refueling water storage tank upon being manually realigned and automatically transferring

suction to the containment sump during the recirculation phase of operation.

The licensee proposed replacing the current LCO statement with the language used in STS LCO that reads:

3.5.3 One ECCS train shall be OPERABLE.

The licensee described the proposed changes to the LCO statement in the following manner:

TVA's proposed revision to the LCO remains consistent with STS requirements for ECCS. For SQN, as with the standard, only one train of ECCS is required in Mode 4 such that single failure is not considered. A train of ECCS consists of a centrifugal charging subsystem and a residual heat removal (RHR) subsystem. Due to the stable conditions associated with Mode 4, and the reduced probability of occurrence of a Design Basis Accident (DBA), SQN's ECCS operational requirements are reduced for this mode of plant operation. It is noted that full ECCS capability may not be available and manual operator action may be utilized to initiate ECCS, as required. This is discussed in Section 6.3.1.4 of the SQN Updated Final Safety Analysis Report (UFSAR). Manual actuation of ECCS is recognized by the STS in the applicable Safety Analyses section of the standard Bases. Accordingly, TVA's proposed change is considered acceptable for conversion to standard requirements. TVA considers the proposed change to be neutral.

The note for LCO 3.5.3 is added to be consistent with NUREG-1431. The note for the LCO is "An RHR train may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned to the ECCS mode of operation." This change is considered to be neutral.

The NRC staff reviewed the proposed changes to the LCO statement and the licensee's justification for the changes, as well as the proposed TS and TS Bases. As stated in section 3.1.2, the NRC staff believes that movement of component descriptions to the TS Bases is a less restrictive change. However, the licensee has a TS Bases Control Program that requires NRC approval of any changes to the TS Bases that would require a change in the TSs. This program maintains adequate control of changes to information in the TS Base and TSs. The NRC staff determined that the addition of the note is a less restrictive change, but the change is acceptable because the licensee is adopting NRC staff guidance in NUREG-1431. The NRC staff determined that the proposed changes are acceptable.

### 3.2.3 Changes to TS 3.5.3 Applicability Statement

The licensee stated that the applicability statement of SQN TS 3.5.2 is equivalent to the STS and thus there is no proposed change in applicability. The NRC staff compared the proposed applicability statement to that in the STS and found them to be identical. The NRC staff determined that this is acceptable.

### 3.2.4 Changes to TS 3.5.3 Action Requirements

The TS action requirement currently reads as follows:

- a. With no ECCS subsystem OPERABLE because of the inoperability of either the centrifugal charging pump or the flow path from the refueling water storage tank, restore at least one ECCS subsystem to OPERABLE status within 1 hour or be in COLD SHUTDOWN within the next 20 hours. LCO 3.0.4.b is not applicable.
- b. With no ECCS subsystem OPERABLE because of the inoperability of either the residual heat removal heat exchanger or residual heat removal pump, restore at least one ECCS subsystem to OPERABLE status or maintain the Reactor Coolant System  $T_{avg}$  less than 350°F by use of alternate heat removal methods.

The licensee proposed replacing the current action requirements with the following action requirements which are identical to those in NUREG-1431:

- a. With the required ECCS residual heat removal (RHR) subsystem inoperable, immediately initiate action to restore required ECCS RHR subsystem to OPERABLE status.
- b. With the required ECCS centrifugal charging subsystem inoperable, within one hour, restore required ECCS centrifugal charging subsystem to OPERABLE status, or be in COLD SHUTDOWN within the next 24 hours.

The licensee described the proposed changes to the LCO statement in the following manner:

TVA's proposed change adopts STS action requirements and language that address either of two conditions; an inoperable RHR subsystem or an inoperable centrifugal charging subsystem. For the condition involving an inoperable RHR subsystem (SQN's current Action [b]), the standard incorporates immediate action for restoring a required RHR subsystem. This change is a TS improvement that provides a level of urgency for ensuring prompt action is taken to restore required cooling capacity. In addition, SQN's current action (b) provides an option for "maintaining the Reactor Coolant System  $T_{avg}$  less than 350°F by use of alternative heat removal methods," if at least one ECCS subsystem is not restored. TVA's proposed change removes this option from the action requirement. Although this option is no longer part of the action, TVA'S proposed change adopts the STS Bases for ECCS 3.5.3 (refer to Bases Section A.1) that describes the option to the operator for an alternate method of heat removal (i.e., use of steam generators). Accordingly, the proposed change to SQN's action (b) provides the level of detail consistent with standard requirements.

TVA's proposed change to SQN's current Action (a) adopts the equivalent actions provided by the standard action requirements. The action requires the operator to restore the required centrifugal charging subsystem to operable status within 1 hour. In addition, provisions for plant shutdown to Mode 5 are changed to have the action time of 24 hours. This provision provides an additional 3 hours to be in

Mode 5 and is consistent with STS. Accordingly, the proposed changes to the actions provide improvements over existing action requirements and are considered less restrictive.

The note for the ACTIONS is "LCO 3.0.4b is not applicable to ECCS centrifugal charging subsystem." The note is relocated from the specific action to a note that applies to the action and is consistent with standard formatting.

A second note added is "The required ECCS residual heat removal (RHR) subsystem may be inoperable for up to 1 hour for surveillance testing of valves provided that alternate heat removal methods are available via the steam generators to maintain reactor coolant system  $T_{avg}$  less than 350 degrees F and provided that the required subsystem is capable of being manually realigned to the ECCS mode of operation."

The second note was added to allow the required ECCS RHR subsystem to be inoperable because of surveillance testing of RCS pressure isolation valve leakage. This allows testing while RCS pressure is sufficient to obtain valid leakage data and following valve closure for RHR decay heat removal path. The condition requiring alternate heat removal methods ensures that the RCS heat up rate can be controlled to prevent Mode 3 entry and thereby ensure that the reduced ECCS operational requirements are maintained. The condition requiring manual realignment capability ensures that in the unlikely event of a DBA during the one hour of surveillance testing, the RHR subsystem can be placed in ECCS recirculation mode when required to mitigate the event. This note is consistent with TVA's Watts Bar TSs

The NRC staff reviewed the proposed changes to the Actions and determined that they are less restrictive than current requirements. The NRC staff reviewed the licensee's justification for the changes and determined that plant operation will not continue outside the accident analysis because the TS Action requirements will make the operators shut the plant down before operation outside the accident analysis can occur. Therefore the proposed changes afford adequate assurance of safety when judged against current regulatory standards. The NRC staff determined that the proposed changes associated with adding Actions (a) and (b) are acceptable.

### 3.2.5 Changes to TS 3.5.3 SRs

The current SR 4.5.3 is:

The ECCS subsystem shall be demonstrated OPERABLE per the applicable Surveillance Requirements of 4.5.2.

The licensee proposed revising the SR to read as follows:

The ECCS train shall be demonstrated OPERABLE per the following applicable Surveillance Requirements of 4.5.2: 4.5.2.b.1, 4.5.2.d, 4.5.2.f, 4.5.2.g.

The licensee provided the following description and justification for the change:

The proposed change is administrative in nature and does not affect existing TS ECCS requirements or other related specifications. The change replaces subsystem with train and defines the applicable SRs of 4.5.2. TVA's proposed change is considered acceptable for conversion to standard requirements. TVA considers the proposed change to be neutral.

The NRC staff reviewed the proposed changes and determined that they are administrative. Therefore they are acceptable.

### 3.3 Summary

The NRC staff's review of the information submitted in the licensee's application and its supplements, as discussed in this safety evaluation, concluded that the licensee's proposed amendment to update SQN TS 3.5.2 and TS 3.5.3 is consistent with the Specifications 3.5.2 and 3.5.3 of STS (NUREG-1431, Revision 3), and that the amendment is in compliance with the ECCS requirements delineated in 10 CFR 50, Appendix A, and 10 CFR 50.46. The NRC staff further concludes that the proposed changes of the SQN TSs provide consistency with the STS, do not sacrifice the existing safety margins, and result in an improved SQN TSs. The proposed amendments of the SQN TSs are, therefore, acceptable.

The proposed license amendments requests were evaluated by the NRC staff to determine whether applicable regulations and requirements continue to be met. Applicable regulatory requirements will continue to be met, adequate defense-in-depth will be maintained, and sufficient safety margins will be maintained. The NRC staff, therefore, finds these license amendments requests acceptable.

The licensee included in its application the revised TS Bases to be implemented with the TS changes. The NRC staff finds that the TS Bases Control Program is the appropriate process for updating the affected TS Bases pages and has, therefore, not included the affected Bases pages with these amendments.

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (74 FR 28580, June 16, 2009). Accordingly, the amendments meet the eligibility criteria

for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: M. Razzaque  
M. Hamm

Dated: January 28, 2010

R. Krich

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A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

*/RA/*

Siva P. Lingam, Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

- Enclosures: 1. Amendment No. 326 to License No. DPR-77
- 2. Amendment No. 319 to License No. DPR-79
- 3. Safety Evaluation

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