



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

October 28, 2021

Mr. James Barstow
Vice President, Nuclear Regulatory
Affairs and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

**SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 - ISSUANCE OF
AMENDMENT NOS. 319, 342, AND 302 REGARDING THE ADOPTION OF
TECHNICAL SPECIFICATION TASK FORCE TRAVELER TSTF-582,
REVISION 2 (EPID L-2021-LLA-0037)**

Dear Mr. Barstow:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment Nos. 319, 342, and 302 to Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68 for the Browns Ferry Nuclear Plant (Browns Ferry), Units 1, 2, and 3, respectively. These amendments are in response to your application dated March 5, 2021.

The amendments revise technical specifications (TSs) related to reactor pressure vessel water inventory control based on Technical Specification Task Force (TSTF) Traveler TSTF-582, Revision 0, "RPV WIC Enhancements."

A copy of our related Safety Evaluation is also enclosed. Notice of issuance will be included in the Commission's monthly *Federal Register* notice.

If you have any questions regarding this matter, please contact me at (301) 415-6459 or by e-mail at Michael.Wentzel@nrc.gov.

Sincerely,

/RA/

Michael J. Wentzel, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-259; 50-260; and 50-296

Enclosures:

1. Amendment No. 319 to DPR-33
2. Amendment No. 342 to DPR-52
3. Amendment No. 302 to DPR-68
4. Safety Evaluation

cc: Listserv



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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 319
Renewed License No. DPR-33

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by the Tennessee Valley Authority (the licensee) dated March 5, 2021, 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-33 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 renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to the start of the interval beginning with the Browns Ferry Nuclear Plant, Unit 3, spring 2022, Cycle 20, refueling outage (3U20).

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility Operating License
and Technical Specifications

Date of Issuance: October 28, 2021

ATTACHMENT TO AMENDMENT NO. 319
BROWNS FERRY NUCLEAR PLANT, UNIT 1
RENEWED FACILITY OPERATING LICENSE NO. DPR-33
DOCKET NO. 50-259

Replace page 3 of Renewed Facility Operating License No. DPR-33 with the attached revised page 3. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

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

<u>Remove Page</u>	<u>Insert Page</u>
1.1-3	1.1-3
3.3-47a	3.3-47a
3.3-47b	3.3-47b
3.3-47c	3.3-47c
3.3-70	3.3-70
3.5-8	3.5-8
3.5-9	3.5-9
3.5-10	3.5-10
3.5-11	3.5-11
3.5-11a	3.5-11a
3.8-18	3.8-18

- (3) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form for sample analysis or equipment and instrument calibration or associated with radioactive apparatus or components;
- (5) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 3952 megawatts thermal.

(2) Technical Specifications

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

For Surveillance Requirements (SRs) that are new in Amendment 234 to Facility Operating License DPR-33, the first performance is due at the end of the first surveillance interval that begins at implementation of the Amendment 234. For SRs that existed prior to Amendment 234, including SRs with modified acceptance criteria and SRs whose frequency of performance is being extended, the first performance is due at the end of the first surveillance interval that begins on the date the surveillance was last performed prior to implementation of Amendment 234.

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	<p>The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:</p> <ol style="list-style-type: none"> The water inventory above the TAF is divided by the limiting drain rate; The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure, for all penetration flow paths below the TAF except: <ol style="list-style-type: none"> Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Initiate action to place channel in trip.	Immediately
	<u>OR</u>	
	A.2.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	<u>AND</u>	
	A.2.2 Initiate action to calculate DRAIN TIME.	Immediately

SURVEILLANCE REQUIREMENTS

-----NOTE-----

These SRs apply to each Function in Table 3.3.5.2-1.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	ALLOWABLE VALUE
1. Shutdown Cooling System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
2. Reactor Water Cleanup (RWCU) System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
3. Recirculation Loop Sample Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero
4. Recirculation Pump Discharge Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

(a) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards A, B, C, and D shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). <u>AND</u> The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE.	Immediately
	<u>AND</u> A.2 Place the degraded voltage relay channel in trip.	15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours

AND

One low pressure ECCS injection/spray subsystem shall be OPERABLE.

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without electrical power.	Immediately
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME. <u>AND</u>	4 hours (continued)

ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME. <u>AND</u>	4 hours
	C.3 Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1 ----- NOTE ----- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----- Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours. <u>AND</u>	Immediately
	D.2 Initiate action to establish secondary containment boundary. <u>AND</u>	Immediately (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	<u>AND</u> D.4 Initiate action to verify two SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. <u>OR</u> DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME \geq 36 hours.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.2	Verify, for the required ECCS injection/spray subsystem, the suppression pool water level is \geq -6.25 inches with or -7.25 inches without differential pressure control.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.4	<p>-----NOTES-----</p> <ol style="list-style-type: none"> 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. <p>-----</p> <p>Operate the required ECCS injection/spray subsystem for \geq 10 minutes.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.6	<p>-----NOTE----- Vessel injection/spray may be excluded. -----</p> <p>Verify the required ECCS injection/spray subsystem can be manually operated.</p>	In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	<p>-----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, and SR 3.8.1.7.</p> <p>-----</p> <p>The following SRs are applicable for Unit 1 and 2 AC sources required to be OPERABLE:</p> <p>SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10.</p>	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 3 DG, the SRs of Unit 3 Technical Specifications are applicable.	In accordance with applicable SRs



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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 342
License No. DPR-52

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated March 5, 2021, 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 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 Renewed Facility Operating License No. DPR-52 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 342, are hereby incorporated in the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to the start of the interval beginning with the Browns Ferry Nuclear Plant, Unit 3, spring 2022, Cycle 20, refueling outage (3U20).

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility Operating License
and Technical Specifications

Date of Issuance: October 28, 2021

ATTACHMENT TO AMENDMENT NO. 342
BROWNS FERRY NUCLEAR PLANT, UNIT 2
FACILITY OPERATING LICENSE NO. DPR-52
DOCKET NO. 50-260

Replace page 3 of Renewed Facility Operating License No. DPR-52 with the attached revised page 3. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

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

<u>Remove Page</u>	<u>Insert Page</u>
1.1-3	1.1-3
1.1-3a	1.1-3a
3.3-48a	3.3-48a
3.3-48b	3.3-48b
3.3-48c	3.3-48c
3.3-71	3.3-71
3.5-8	3.5-8
3.5-9	3.5-9
3.5-10	3.5-10
3.5-11	3.5-11
3.5-11a	3.5-11a
3.8-18	3.8-18

sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

- (4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form for sample analysis or equipment and instrument calibration or associated with radioactive apparatus or components;
- (5) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 3952 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 342, are hereby incorporated in the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

For Surveillance Requirements (SRs) that are new in Amendment 253 to Facility Operating License DPR-52, the first performance is due at the end of the first surveillance interval that begins at implementation of the Amendment 253. For SRs that existed prior to Amendment 253, including SRs with modified acceptance criteria and SRs whose frequency of performance is being extended, the first performance is due at the end of the first surveillance interval that begins on the date the surveillance was last performed prior to implementation of Amendment 253.

- 3) The licensee is authorized to relocate certain requirements included in Appendix A and the former Appendix B to licensee-controlled documents. Implementation of this amendment shall include the relocation of these requirements to the appropriate documents, as described in the licensee's

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	<p>The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:</p> <ol style="list-style-type: none"> The water inventory above the TAF is divided by the limiting drain rate; The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure, for all penetration flow paths below the TAF except: <ol style="list-style-type: none"> Penetration flow path connected to an intact closed system, or isolated by manual or

(continued)

1.1 Definitions (continued)

DRAIN TIME (continued)

automatic valves that are closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or
 3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation devices without offsite power.
- c. The penetration flow paths required to be evaluated per paragraph b are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;
- d. No additional draining events occur; and
- e. Realistic cross-sectional areas and drain rates are used.

A bounding DRAIN TIME may be used in lieu of a calculated value.

INSEVICE TESTING PROGRAM

The INSERVICE TESTING PROGRAM is the licensee program that fulfills the requirements of 10 CFR 50.55a(f).

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Initiate action to place channel in trip.	Immediately
	<u>OR</u>	
	A.2.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	<u>AND</u>	
	A.2.2 Initiate action to calculate DRAIN TIME.	Immediately

SURVEILLANCE REQUIREMENTS

-----NOTE-----

These SRs apply to each Function in Table 3.3.5.2-1.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	ALLOWABLE VALUE
1. Shutdown Cooling System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
2. Reactor Water Cleanup (RWCU) System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
3. Recirculation Loop Sample Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero
4. Recirculation Pump Discharge Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

(a) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards A, B, C, and D shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). <u>AND</u> The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE.	Immediately
	<u>AND</u> A.2 Place the degraded voltage relay channel in trip.	15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours

AND

One low pressure ECCS injection/spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. DRAIN TIME < 36 hours and \geq 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME. <u>AND</u>	4 hours
	C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME. <u>AND</u>	4 hours
	C.3 Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1 -----NOTE----- Required ECCS injections/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----- Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for \geq 36 hours. <u>AND</u>	Immediately (continued)

ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.2 Initiate action to establish secondary containment boundary.	Immediately
	<u>AND</u>	
	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	<u>AND</u>	
	D.4 Initiate action to verify two SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. <u>OR</u> DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME \geq 36 hours.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.2	Verify, for the required ECCS injection/spray subsystem, the suppression pool water level is \geq -6.25 inches with or -7.25 inches without differential pressure control.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.4	<p>-----NOTES-----</p> <ol style="list-style-type: none"> 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. <p>-----</p> <p>Operate the required ECCS injection/spray subsystem for \geq 10 minutes.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.6	<p>-----NOTE----- Vessel injection/spray may be excluded. -----</p> <p>Verify the required ECCS injection/spray subsystem can be manually operated.</p>	In accordance with the Surveillance Frequency Control Program.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	<p>-----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, and SR 3.8.1.7.</p> <p>-----</p> <p>The following SRs are applicable for Unit 1 and 2 AC sources required to be OPERABLE:</p> <p>SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10.</p>	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 3 DG, the SRs of Unit 3 Technical Specifications are applicable.	In accordance with applicable SRs



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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 302
License No. DPR-68

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated March 5, 2021, 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 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 Renewed Facility Operating License No. DPR-68 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 302, are hereby incorporated in the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to the start of the interval beginning with the Browns Ferry Nuclear Plant, Unit 3, spring 2022, Cycle 20, refueling outage (3U20).

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility Operating License
and Technical Specifications

Date of Issuance: October 28, 2021



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

ATTACHMENT TO AMENDMENT NO. 302

BROWNS FERRY NUCLEAR PLANT, UNIT 3

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Replace page 3 of Renewed Facility Operating License No. DPR-68 with the attached revised page 3. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

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

<u>Remove Page</u>	<u>Insert Page</u>
1.1-3	1.1-3
3.3-48a	3.3-48a
3.3-48b	3.3-48b
3.3-48c	3.3-48c
3.3-71	3.3-71
3.5-8	3.5-8
3.5-9	3.5-9
3.5-10	3.5-10
3.5-11	3.5-11
3.5-11a	3.5-11a
3.8-18	3.8-18

- (3) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form for sample analysis or equipment and instrument calibration or associated with radioactive apparatus or components;
- (5) Pursuant to the Act and 10 CFR Parts 30 and 70, to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 3952 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 302, are hereby incorporated in the renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

For Surveillance Requirements (SRs) that are new in Amendment 212 to Facility Operating License DPR-68, the first performance is due at the end of the first surveillance interval that begins at implementation of the Amendment 212. For SRs that existed prior to Amendment 212, including SRs with modified acceptance criteria and SRs whose frequency of performance is being extended, the first performance is due at the end of the first surveillance interval that begins on the date the surveillance was last performed prior to implementation of Amendment 212.

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	<p>The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:</p> <ol style="list-style-type: none"> The water inventory above the TAF is divided by the limiting drain rate; The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure, for all penetration flow paths below the TAF except: <ol style="list-style-type: none"> Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Initiate action to place channel in trip.	Immediately
	<u>OR</u>	
	A.2.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	<u>AND</u>	
	A.2.2 Initiate action to calculate DRAIN TIME.	Immediately

SURVEILLANCE REQUIREMENTS

-----NOTE-----

These SRs apply to each Function in Table 3.3.5.2-1.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	ALLOWABLE VALUE
1. Shutdown Cooling System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
2. Reactor Water Cleanup (RWCU) System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
3. Recirculation Loop Sample Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero
4. Recirculation Pump Discharge Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

(a) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards 3EA, 3EB, 3EC, and 3ED shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). <u>AND</u> The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE.	Immediately
	<u>AND</u> A.2 Place the degraded voltage relay channel in trip.	15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be \geq 36 hours

AND

One low pressure ECCS injection/spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. DRAIN TIME < 36 hours and \geq 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	<u>AND</u>	
	C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	<u>AND</u>	
	C.3 Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	<p>D.1 ----- NOTE ----- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. -----</p> <p>Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for \geq 36 hours.</p> <p><u>AND</u></p>	<p>Immediately</p> <p>(continued)</p>

ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.2 Initiate action to establish secondary containment boundary.	Immediately
	<u>AND</u>	
	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	<u>AND</u>	
	D.4 Initiate action to verify two SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. <u>OR</u> DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME \geq 36 hours.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.2	Verify, for the required ECCS injection/spray subsystem, the suppression pool water level is \geq -6.25 inches with or -7.25 inches without differential pressure control.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.4	<p>-----NOTES-----</p> <ol style="list-style-type: none"> 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. <p>-----</p> <p>Operate the required ECCS injection/spray subsystem for \geq 10 minutes.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.6	<p>-----NOTE----- Vessel injection/spray may be excluded. -----</p> <p>Verify the required ECCS injection/spray subsystem can be manually operated.</p>	In accordance with the Surveillance Frequency Control Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	<p>-----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, and SR 3.8.1.7.</p> <p>-----</p> <p>The following SRs are applicable for Unit 3 AC sources required to be OPERABLE:</p> <p>SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10.</p>	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 1 and 2 DG, the SRs of Unit 1 and 2 Technical Specifications are applicable.	In accordance with applicable SRs



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 319, 342, AND 302

TO RENEWED FACILITY OPERATING LICENSE NOS. DPR-33, DPR-52, AND DPR-68

TENNESSEE VALLEY AUTHORITY

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

DOCKET NOS. 50-259, 50-260, AND 50-296

1.0 INTRODUCTION

Tennessee Valley Authority (TVA, the licensee) requested changes to the technical specifications (TSs) for Browns Ferry Nuclear Plant (Browns Ferry), Units 1, 2, and 3 by license amendment request (LAR), dated March 5, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21064A508). In its application, the licensee requested that the U.S. Nuclear Regulatory Commission (NRC, the Commission) process the proposed LAR under the Consolidated Line Item Improvement Process (CLIIP). The proposed changes would revise the TSs related to reactor pressure vessel (RPV) water inventory control (WIC) based on Technical Specifications Task Force (TSTF) -582, Revision 0, "RPV WIC Enhancements" (ADAMS Accession No. ML19240A260) and the associated NRC staff safety evaluation (SE) of TSTF-582 (ADAMS Accession No. ML20219A333).

The boiling water reactor (BWR) RPV design includes multiple penetrations located below the top of active fuel (TAF). These penetrations provide entry for control rods, recirculation flow, reactor water cleanup (RWCU), and shutdown cooling. Since these penetrations are below the TAF, this creates a potential to drain the RPV water inventory and lose effective core cooling. The loss of water inventory and effective core cooling can potentially lead to fuel cladding failure and radioactive release. Drain Time is the time it would take for the water inventory in and above the RPV to drain to the TAF.

1.1 Proposed TS Changes to Adopt TSTF-582

In accordance with NRC staff-approved TSTF-582, the licensee proposed changes that would revise the Browns Ferry TSs related to RPV WIC to incorporate operating experience and to correct errors and omissions that the licensee incorporated into the TSs when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control" (ADAMS Accession No. ML16074A448). Specifically, the licensee proposed the following changes to adopt TSTF-582:

- The Drain Time definition in TS 1.1 would be revised to move the examples of common mode failure mechanisms to the Bases and delete seismic events.
- In TS 1.1, Drain Time definition, the exception from considering the Drain Time for penetration flow paths isolated with manual or automatic valves that are “locked, sealed, or otherwise secured” would be revised to apply the exception for manual or automatic valves that are “closed and administratively controlled.”
- The Actions of TS 3.3.5.2 would be revised to permit placing an inoperable isolation channel in trip as an alternative to declaring the associated penetration flow path incapable of automatic isolation.
- TS 3.3.5.2, Required Action B.2 requires calculating Drain Time with a Completion Time of “immediately.” The Required Action would be renumbered as A.2.2 and revised to state, “Initiate action to calculate Drain Time.”
- The Browns Ferry design contains additional isolation instrumentation functions based on low RPV water level that could be credited when calculating Drain Time. Those functions would be added to the required functions in TS 3.3.5.2.
- In TS 3.5.2, the first use of the acronym “SGT” would be defined in Required Action C.3 and the acronym “SGT” would be used in Required Action D.4.
- TS 3.3.5.2 and TS 3.5.2 would be revised to eliminate the requirement for a manual emergency core cooling system (ECCS) initiation signal to start the required ECCS injection/spray subsystem, and to instead rely on manual valve alignment and pump start. TS 3.5.2 Surveillance Requirements (SRs) related to manual initiation using the ECCS signal (such as verifying automatic alignment of valves on an initiation signal) would be eliminated. Related to this change, the TS 3.3.5.2 functions, SRs, and Actions that only support manual initiate on using an ECCS signal (including interlocks and minimum flow instruments) would be eliminated.
- TS 3.8.2, “AC [Alternating Current] Sources - Shutdown,” SR 3.8.2.1, would be revised to not require SRs that test the ability of the automatic diesel generator to start in Modes 4 and 5. TSTF-542 eliminated the automatic ECCS initiation in Modes 4 and 5.

1.2 Additional Proposed TS Changes

The licensee proposed to make the following additional changes:

- TS 3.3.8.1, “Loss of Power (LOP) Instrumentation,” would be revised to delete “When the associated diesel generator [DG] is required to be OPERABLE by LCO [limiting condition for operation 3.8.2, ‘AC Sources – Shutdown’,” from the Applicability.
- SR 3.8.2.1 would be revised to add SR 3.8.1.4 and SR 3.8.1.18 to the list of TS 3.8.1 SRs that are not applicable under SR 3.8.2.1.

The NRC staff notes that the above proposed changes are consistent with TSTF-583-T, Revision 0, “TSTF-582 Diesel Generator Variation” (ADAMS Accession No. ML20248H330).

1.2.1 Variations

- The licensee proposed to correct editorial errors in the spelling of “DRAIN TIME” in the last paragraph of the Browns Ferry, Unit 2 TS Section 1.1 DRAIN TIME definition. Additionally, Browns Ferry, Unit 2 TS 3.5.2 Required Action D.4 corrects the spelling of “subsystems.”
- The licensee proposed to create Mode 4 and 5 operability requirements to allow crediting auto-isolation of the recirculation loop sample valves in support of the Exception 2 in the Drain Time definition for penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. This change would add the Recirculation Loop Sample Isolation Instrumentation and Recirculation Pump Discharge Isolation Functions to TS Table 3.3.5.2-1.

2.0 REGULATORY EVALUATION

2.1 Regulatory Requirements

The regulation at 10 CFR 50.36(c)(2) requires that TSs include LCOs. Per 10 CFR 50.36(c)(2)(i), LCOs “are the lowest functional capability or performance levels of equipment required for safe operation of the facility.” The regulation also requires that when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met.

The regulation at 10 CFR 50.36(c)(3) requires that TSs include items in the category of SRs, which are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

2.2 Regulatory Guidance

The NRC staff’s guidance for the review of TSs is in Chapter 16.0, “Technical Specifications,” of NUREG-0800, Revision 3, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition” (SRP), March 2010 (ADAMS Accession No. ML100351425). As described therein, as part of the regulatory standardization effort, the NRC staff has prepared standard TSs (STTs) for each of the LWR nuclear designs. Accordingly, the NRC staff’s review includes consideration of whether the proposed changes are consistent with the “Standard Technical Specifications, General Electric BWR/4 Plants,” NUREG-1434, Volume 1, “Specifications,” and Volume 2, “Bases,” Revision 4.0, April 2012 (ADAMS Accession Nos. ML12104A192 and ML12104A193, respectively), as modified by NRC-approved travelers.

Traveler TSTF-582 revised the STSs related to RPV WIC to incorporate operating experience and to correct editorial errors in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control" (ADAMS Accession No. ML16074A448). The NRC approved TSTF-542, Revision 2, on December 20, 2016 (ADAMS Package Accession No. ML16343B066). The NRC staff approved TSTF-582 under the CLIIP in letter dated August 13, 2020 (ADAMS Accession No. ML20219A333). The TSTF-582 SE states that a licensee may adopt the STS changes approved in TSTF-582, if the licensee has already adopted the STS changes approved in TSTF-542.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes to Adopt TSTF-582

The NRC staff compared the licensee's proposed TS changes in Section 1.0 of this SE against the changes approved in TSTF-582. In accordance with the SRP Chapter 16.0, the NRC staff determined that the STS changes approved in TSTF-582 are applicable to the Browns Ferry TSs because Browns Ferry Units 1, 2, and 3 are of BWR/4 design and the NRC staff approved the TSTF-582 changes for BWR/4 designs. The licensee meets the TSTF-582 SE provision for adoption of TSTF-582 since the licensee adopted Traveler TSTF-542 on December 26, 2019 (ADAMS Accession No. ML19294A011) in Amendment Nos. 311, 334, and 294 for Browns Ferry, Units 1, 2, and 3, respectively. Therefore, the NRC staff concludes that the licensee's proposed changes to the Browns Ferry TSs in Section 1.0 of this SE are acceptable in that they are consistent with TSTF-582 and the terms for use stated in the NRC staff's SE of TSTF-582.

The NRC staff finds that proposed changes to the TS 1.1 definition, and LCOs 3.3.5.2 and 3.5.2 correctly specify the lowest functional capability or performance levels of equipment required for safe operation of the facility in accordance with 10 CFR 50.36(c)(2)(i). Also, the NRC staff finds that proposed changes to the Actions of LCOs 3.3.5.2 and 3.5.2 are adequate remedial actions to be taken until each LCO can be met to provide protection to the health and safety of the public, thereby satisfying 10 CFR 50.36(c)(2)(i).

The NRC staff finds that the proposed revisions to the SRs in TS 3.3.5.2, 3.5.2, and 3.8.2 continue to provide requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met in accordance with 10 CFR 50.36(c)(3).

Thus, the proposed changes continue to meet the requirements of 10 CFR 50.36(c)(2)(i) and 10 CFR 50.36(c)(3) as discussed in Section 3.0 of the NRC staff's SE of TSTF-582.

3.2 Additional Proposed TS Changes

3.2.1 TS 3.3.8.1, Applicability

The licensee stated that TS 3.8.2 does not require automatic start and loading of a DG within 10 seconds on an ECCS initiation signal or a loss of offsite power signal. Currently, TS 3.3.8.1, "Loss of Power (LOP) Instrumentation," is applicable in Modes 1, 2, and 3, and when the associated DG is required to be operable by TS 3.8.2. The NRC staff confirmed that TS 3.8.2 no longer requires automatic start and loading of a DG on a LOP signal. The NRC staff finds it acceptable to revise the Applicability of LCO 3.3.8.1 by deleting "When the associated diesel generator is required to be OPERABLE by LCO 3.8.2, 'AC Sources – Shutdown'," because the LOP instrumentation that generates the LOP signal does not need to be operable when the DG

is required to be operable by TS 3.8.2. Therefore, the NRC staff concludes that the LCO applicability changes will continue to provide for the lowest functional capability or performance levels of equipment required for safe operation of the facility and, therefore, meet the LCO requirements of 10 CFR 50.36(c)(2).

3.2.2 SR 3.8.2.1

LCO 3.8.2, "AC Sources - Shutdown," requires one offsite circuit and one DG capable of supplying one division of the onsite Class 1E AC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems - Shutdown," to be operable in shutdown conditions. The existing SR 3.8.2.1 lists the TS 3.8.1 SRs that are applicable in shutdown conditions with some exceptions.

TS SR 3.8.1.4 states, "Verify each DG starts from standby condition and achieves, in ≤ 10 seconds, voltage ≥ 3940 V and frequency ≥ 58.8 Hz. Verify after DG fast start from standby conditions that the DG achieves steady state voltage ≥ 3940 V and ≤ 4400 V and frequency ≥ 58.8 Hz and ≤ 61.2 Hz." The 10 second start requirement associated with the DG automatic start supports the assumptions in the design basis LOCA analysis. The NRC staff confirmed that 10 second timing is not required during a manual DG start to respond to a draining event, which has a minimum Drain Time of 1 hour. In addition, SR 3.8.1.2, which requires the DG to start from standby conditions and achieve the required steady state voltage and frequency ranges, is applicable under SR 3.8.2. The NRC staff finds that the SR 3.8.1.4 testing for the DG's capability to achieve required steady state voltage and frequency ranges will be performed in SR 3.8.1.2 since SR 3.8.1.2 provides the test for this DG capability. Therefore, the NRC staff finds it acceptable to add SR 3.8.1.4 to the list of TS 3.8.1 SRs that are not applicable under SR 3.8.2.1.

TS SR 3.8.1.8 states, "Verify interval between each sequenced load block is within the allowable values for each load sequencer timer." This SR verifies the load sequence time interval tolerance between each sequenced load block when loads are sequentially connected to the engineered safety features (ESF) bus by automatic sequencer while the DG is tied to the ESF bus. TS 3.5.2 requires manual starting of the equipment for water injection to respond to a draining event so that the DG will be manually loaded during a draining event. No other postulated events require automatic loading of the DG during shutdown conditions. The NRC staff confirmed that with respect to SR 3.8.8, the load sequencers are used for the automatic loading of the DG and are not used during a manual loading of the DG. Therefore, the NRC staff finds it acceptable to add SR 3.8.1.8 to the list of TS 3.8.1 SRs that are not applicable under SR 3.8.2.1.

The NRC staff finds that the proposed changes to revise SR 3.8.2.1 are acceptable because the remaining applicable SRs will continue to demonstrate the operability of the required AC power sources and, as such, ensure the availability of the AC power required to operate the plant in a safe manner and mitigate postulated events during shutdown conditions. Therefore, the NRC staff finds the proposed changes to SR 3.8.2.1 are acceptable because the changes continue to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the associated LCO will continue to be met in accordance with 10 CFR 50.36(c)(3).

3.2.3 LCO 3.5.2 Note

Browns Ferry SR 3.5.2.5 requires operating the ECCS subsystem periodically to verify its operability. TSTF-582 added a Note to Browns Ferry SR 3.5.2.5 (and renamed it to SR 3.5.2.4) that permits a subsystem to be credited for operating in normal mode as demonstrating operation of the required ECCS subsystem. As stated in the TSTF-582 justification, "This Note permits crediting the normal operation of an RHR Shutdown Cooling subsystem to satisfy the SR. The revised SR continues to ensure the ECCS injection/spray subsystem can inject water into the RPV if needed for defense-in-depth, while eliminating unnecessary testing."

The NRC staff confirmed that removal of SR 3.5.2.4 by TSTF-582 and the addition of the SR Note to SR 3.5.2.5 (renumbered SR 3.5.2.4) eliminates the need for the LCO Note to consider the ECCS subsystem operable while operating in decay heat removal mode. The NRC staff finds the proposed change to LCO 3.5.2 acceptable because the NOTE of SR 3.5.2.4 will continue to demonstrate the operability of the ECCS subsystem and the associated LCO will continue to be met in accordance with 10 CFR 50.36(c)(3).

3.2.4 Variations

The licensee proposed changes to add RPV WIC Instrumentation functions for Recirculation Loop Sample Isolation Instrumentation and Recirculation Pump Discharge Isolation Instrumentation within TS Table 3.3.5.2-1. The addition of these two functions would allow crediting automatic isolation of the recirculation loop sample valves and recirculation pump discharge isolation valves in support of Exception 2 in the Drain Time definition for penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation.

The NRC staff reviewed the proposed addition of the above functions to Table 3.3.5.2-1, Functions 3.a and 4.a, Reactor Vessel Water Level – Low Low Low, Level 1, and Function 4.b, Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive). Function 3.a controls Group 1 primary containment isolation valves, including the recirculation loop sample isolation valves, and requires two channels per trip system for a total of four operable channels to account for a single active failure. Functions 4.a and 4.b controls automatic closure of the recirculation pump discharge isolation valves and requires four channels per function. The four reactor water level channels input to two two-out-of-two trip systems, with each of the two trip systems associated with one of the two recirculation pump discharge isolation valves, to account for a single active failure.

TSTF-542 states that, with one ECCS injection/spray subsystem and non-safety related injection sources, defense-in-depth will be maintained. The defense-in-depth measure is consistent with other events considered during shutdown with no additional single failure assumed. The drain time controls, in addition to the required ECCS injection/spray subsystem, provide reasonable assurance that an unexpected draining event can be prevented or mitigated before the RPV water level would be lowered to the TAF.

The licensee proposed requiring only a single recirculation loop sample isolation valve to be operable to be credited in the Drain Time Exception, and thus one channel in both trip systems are required to be operable for proposed Function 3.a. The Allowable Value (AV) of ≥ 398 inches above vessel zero, is consistent with the AV for TS Table 3.3.6.1-1 Function 1.a. Proposed Functions 4.a and 4.b would require the recirculation pump discharge valve credited

in the Drain Time Exception to have two channels in one trip system operable, with AVs of ≥ 398 inches above vessel zero, and ≥ 215 psig, respectively, which are consistent with the AVs for TS Table 3.3.5.1-1 Functions 2.a and 2.d.

Based on the information above, the NRC staff determined that the proposed additional functions continue to meet the requirements of TS 3.3.5.2 and 10 CFR 50.36, and therefore the addition of Functions 3.a, 4.a, and 4.b to Table 3.3.5.2-1, is acceptable.

3.2.5 Editorial

The licensee proposed to correct an error in the spelling of "DRAIN TIME" in the last paragraph of the Browns Ferry, Unit 2 TS Section 1.1 DRAIN TIME definition. Additionally, Browns Ferry, Unit 2 TS 3.5.2 Required Action D.4 corrects the spelling of "subsystems." The NRC staff reviewed the proposed changes and determined that they are acceptable because they are editorial clarifications and do not substantively change TS requirements.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Alabama State official was notified of the proposed issuance of the amendment on October 4, 2021. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change the requirements with respect to installation or use of a facility's components located within the restricted area as defined in 10 CFR Part 20. 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 previously issued a proposed finding that the amendment involves no significant hazards consideration published in the *Federal Register* on May 18, 2021 (86 FR 26956), and there has been no public comment on such finding. 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) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: T. Sweat, NRR

Date: October 28, 2021

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 - ISSUANCE OF AMENDMENT NOS. 319, 342, AND 302 REGARDING THE ADOPTION OF TECHNICAL SPECIFICATION TASK FORCE TRAVELER TSTF-582, REVISION 2 (EPID L-2021-LLA-0037) DATED OCTOBER 28, 2021

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