



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

August 30, 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. 318, 341, AND 301 REGARDING CHANGES TO
TECHNICAL SPECIFICATION 3.8.6, “BATTERY CELL PARAMETERS”
(EPID L-2020-LLA-0177)

Dear Mr. Barstow:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 318, 341, and 301 to Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68 for the Browns Ferry Nuclear Plant, Units 1, 2, and 3, respectively. These amendments are in response to your application dated August 6, 2020, as supplemented by letter dated July 21, 2021.

The amendments revise technical specification 3.8.6, “Battery Cell Parameters,” to clarify the operability requirements for the unit, shutdown board, and diesel generator batteries.

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

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. 318 to DPR-33
2. Amendment No. 341 to DPR-52
3. Amendment No. 301 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. 318
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 August 6, 2020, as supplemented by letter dated July 21, 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 Renewed 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. 318, 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 its date of issuance and shall be implemented within 60 days from the date of issuance.

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: August 30, 2021

ATTACHMENT TO LICENSE AMENDMENT NO. 318

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 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</u>	<u>Insert</u>
3.8-30	3.8-30
3.8-32	3.8-32

- (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. 318, 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.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days
<p>B. Required Action and associated Completion Time of Condition A not met.</p> <p><u>OR</u></p> <p>One or more batteries with average electrolyte temperature of the representative cells not within limits.</p>	B.1 Declare associated battery inoperable.	Immediately

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL (e)
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.07 V
Specific Gravity (b) (c)(d)	≥ 1.20	≥ 1.195 <u>AND</u> Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells <u>AND</u> Average of all connected cells ≥ 1.195

- (a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during equalizing charges provided it is not overflowing.
- (b) Corrected for electrolyte temperature.
- (c) As an alternative to the specific gravity measurements, a battery charging current of < 1 amp for Unit and Shutdown Board batteries and < 0.5 amp for DG batteries when on float charge is acceptable only during a maximum of 7 days following a battery recharge. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.
- (d) Alternate values may be used for a limited number of cells provided demonstrated battery capacity at the last discharge test meets the minimum qualifying value.
- (e) Category C battery cell parameters are considered met when the corresponding Category B cell parameters are met.



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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 341
Renewed License No. DPR-52

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 August 6, 2020, as supplemented by letter dated July 21, 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 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. 341, 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 its date of issuance and shall be implemented within 60 days from the date of issuance.

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: August 30, 2021

ATTACHMENT TO LICENSE AMENDMENT NO. 341

BROWNS FERRY NUCLEAR PLANT, UNIT 2

RENEWED FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Replace page 3 of Renewed Facility Operating License No. DPR-52 with the attached 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</u>	<u>Insert</u>
3.8-30	3.8-30
3.8-32	3.8-32

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. 341, 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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days
<p>B. Required Action and associated Completion Time of Condition A not met.</p> <p><u>OR</u></p> <p>One or more batteries with average electrolyte temperature of the representative cells not within limits.</p>	B.1 Declare associated battery inoperable.	Immediately

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL (e)
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.07 V
Specific Gravity (b) (c)(d)	≥ 1.20	≥ 1.195 <u>AND</u> Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells <u>AND</u> Average of all connected cells ≥ 1.195

- (a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during equalizing charges provided it is not overflowing.
- (b) Corrected for electrolyte temperature.
- (c) As an alternative to the specific gravity measurements, a battery charging current of < 1 amp for Unit and Shutdown Board batteries and < 0.5 amp for DG batteries when on float charge is acceptable only during a maximum of 7 days following a battery recharge. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.
- (d) Alternate values may be used for a limited number of cells provided demonstrated battery capacity at the last discharge test meets the minimum qualifying value.
- (e) Category C battery cell parameters are considered met when the corresponding Category B cell parameters are met.



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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 301
Renewed License No. DPR-68

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 August 6, 2020, as supplemented by letter dated July 21, 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 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. 301, 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 its date of issuance and shall be implemented within 60 days from the date of issuance.

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: August 30, 2021

ATTACHMENT TO LICENSE AMENDMENT NO. 301

BROWNS FERRY NUCLEAR PLANT, UNIT 3

RENEWED FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Replace page 3 of Renewed Facility Operating License No. DPR-68 with the attached 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</u>	<u>Insert</u>
3.8-30	3.8-30
3.8-32	3.8-32

- (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. 301, 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.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days
<p>B. Required Action and associated Completion Time of Condition A not met.</p> <p><u>OR</u></p> <p>One or more batteries with average electrolyte temperature of the representative cells not within limits.</p>	B.1 Declare associated battery inoperable.	Immediately

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL (e)
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.07 V
Specific Gravity (b) (c)(d)	≥ 1.20	≥ 1.195 <u>AND</u> Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells <u>AND</u> Average of all connected cells ≥ 1.195

- (a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during equalizing charges provided it is not overflowing.
- (b) Corrected for electrolyte temperature.
- (c) As an alternative to the specific gravity measurements, a battery charging current of < 1 amp for Unit and Shutdown Board batteries and < 0.5 amp for DG batteries when on float charge is acceptable only during a maximum of 7 days following a battery recharge. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.
- (d) Alternate values may be used for a limited number of cells provided demonstrated battery capacity at the last discharge test meets the minimum qualifying value.
- (e) Category C battery cell parameters are considered met when the corresponding Category B cell parameters are met.



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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NOS. 318, 341, AND 301
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

By letter dated August 6, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20219A762), as supplemented by letter dated July 21, 2021 (ADAMS Accession No. ML21202A150), the Tennessee Valley Authority (the licensee) submitted a license amendment request for Browns Ferry Nuclear Plant (Browns Ferry), Units 1, 2, and 3. The requested changes would revise Technical Specification (TS) 3.8.6, "Battery Cell Parameters," to clarify the operability requirements for the unit, shutdown board, and diesel generator (DG) batteries.

The supplement letter dated July 21, 2021 provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on October 6, 2020 (85 FR 63149).

2.0 REGULATORY EVALUATION

2.1 System Description

The licensee provided a description of the Browns Ferry 250-Volt (V) direct current (dc) power system in Section 2.1, "System Design and Operation," of its August 6, 2020, letter. In addition, in Section 4.1, "Applicable Regulatory Requirements," of its August 6, 2020, letter, the licensee stated:

The system is arranged and powered so that the probability of failure of power to any single battery board bus or shutdown board control bus is very low and that such a failure does not prevent the safe shutdown and cooldown of all three units in the event of the loss of offsite power and a design basis accident in any one unit. The system is designed to meet the intent of the IEEE [Institute of Electrical and Electronics Engineers] criteria for nuclear power plant protection systems. The Unit, Shutdown Board, and DG batteries were designed to IEEE-279 Standards, and they have been analyzed and meet IEEE-450 Standards, 1987.

Each battery, and its associated equipment, is easily accessible for inspection and testing. The DC system is ungrounded and has a ground detection alarm. The most probable mode of battery failure would be deterioration of a single cell which can be detected well in advance by standard, routine battery inspections and testing. The system is designed so that the batteries cannot be paralleled.

2.2 Licensee's Proposed Changes

The licensee requested the following changes to Browns Ferry, Units 1, 2, and 3, TSs 3.8.6 (additions in bold, deletions in strikeout):

Required Action B

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days
B. Required Action and associated Completion Time of Condition A not met. <u>OR</u> One or more batteries with average electrolyte temperature of the representative cells not within limits. <u>OR</u> One or more batteries with one or more battery cell parameters not within Category C values.	B.1 Declare associated battery inoperable.	Immediately

Table 3.8.6-1

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL (e)
Electrolyte Level	> Minimum level in indication mark, and ≤ ¼ inch above maximum level indication mark (a)	> Minimum level in indication mark, and ≤ ¼ inch above maximum level indication mark (a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	≥ 2.07 V
Specific Gravity (b)(c)(d)	≥ 1.20	≥ 1.195 <u>AND</u> Average of all connected cells > 1.205	Not more than 0.020 below average of all connected cells <u>AND</u> Average of all connected cells ≥ 1.195

- (a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during equalizing charges provided it is not overflowing.
- (b) Corrected for electrolyte temperature.
- (c) As an alternative to the specific gravity measurements, a battery charging current of < 1 amp for Unit and Shutdown Board batteries and < 0.5 amp for DG batteries when on float charge is acceptable only during a maximum of 7 days following a battery recharge. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the 7 day allowance.
- (d) Alternate values may be used for a limited number of cells provided demonstrated battery capacity at the last discharge test meets the minimum qualifying value.
- (e) Category C battery cell parameters are considered met when the corresponding Category B cell parameters are met.**

The licensee discussed the reason for the proposed changes in Section 2.3, "Reason for the Proposed Change," of its August 6, 2020, letter. The licensee stated that during the performance of a quarterly check of the DG C Battery in June 2018, as well as testing of the main bank and shutdown board batteries at various times, while the Table 3.8.6-1 Categories A and B limits continued to be met, the as-found specific gravity of a connected cell did not meet the Category C limit that each connected cell must be not more than 0.020 below the average of

all connected cells. Furthermore, the licensee stated that due to the acceptable range of specific gravity being wider than 0.020, the natural variance of specific gravity can cause a given cell's specific gravity to be more than 0.020 below the average and still be acceptable. Thus, the licensee proposed the changes in this application to correct this situation.

2.3 Regulatory Requirements and Guidance

The NRC staff considered the following regulatory requirements, guidance, and licensing and design-basis information during its review of the proposed changes.

Section 182.a of the Atomic Energy Act of 1954, as amended, requires nuclear power plant operating licenses to include TS as part of any license. Section 50.36, "Technical specifications," of Title 10 of the *Code of Federal Regulations* (10 CFR) establishes the regulatory requirements related to the content of TSs. Paragraph 50.36(a)(1) requires an application for an operating license to include proposed TSs. A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the TSs.

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

Paragraph 50.36(c)(2) of 10 CFR states that LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility, and when an LCO is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the LCO can be met.

As discussed in Appendix A of the Browns Ferry Updated Final Safety Analysis Report (ADAMS Accession No. ML19298B452) and Section 4.1 of the August 6, 2020, letter, each Browns Ferry unit conforms with the intent of the Atomic Energy Commission (AEC) draft General Design Criteria (GDC) for Nuclear Power Plant Construction Permits. The following AEC draft GDCs are applicable to the Browns Ferry onsite electrical power system.

AEC draft GDC 24, "Emergency Power for Protection Systems," states:
"In the event of loss of all offsite power, sufficient alternate sources of power shall be provided to permit the required functioning of the protection systems."

AEC draft GDC 39, "Emergency Power for Engineered Safety Features," states:
"Alternate power systems shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning required of the engineered safety features. As a minimum, the onsite power system and the offsite power system shall each, independently, provide this capacity assuming a failure of a single active component in each power system."

As discussed in Section 8.4 of the Browns Ferry Updated Final Safety Analysis Report (ADAMS Accession No. ML19324C991) and Section 4.1 of the August 6, 2020 letter, each Browns Ferry unit also meets the independence, redundancy, and testability requirements of 10 CFR Part 50, Appendix A, GDC 17, "Electric Power Systems," which states, in part:

The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition," Section 8.3.2, Revision 4, "DC Power Systems (Onsite)" (ADAMS Accession No. ML100740391), provides the NRC staff guidance for reviewing onsite power DC power systems' compliance with GDC 17. Section 8.3.2 states that meeting GDC 17 "provides assurance that a reliable dc power supply will be provided for all facility operating modes, including anticipated operational occurrences and design-basis accidents, to permit the performance of safety functions and other vital functions, even in the event of a single failure."

3.0 TECHNICAL EVALUATION

Browns Ferry TS LCO 3.8.6 requires the battery cell parameters for the unit, shutdown board, and DG batteries to be within the limits of Table 3.8.6-1 when associated DC electrical power subsystems are required to be operable during operating and shutdown modes of operation. According to the Browns Ferry TS 3.8.6 Bases, Table 3.8.6-1: (1) Categories A and B define the normal parameter limits for each designated pilot cell in each battery (pilot cells are those whose temperature, voltage, and electrolyte specific gravity approximate the state of charge of the entire battery) and each connected cell, respectively, indicating that the battery has enough capacity to perform its safety function and (2) Category C defines the limits for each connected cell, indicating assurance that sufficient capacity exists to perform the intended safety function and maintain a margin of safety.

The NRC staff reviewed the proposed changes against the applicable criterion in 10 CFR 50.36(c)(2)(i). When TS LCO 3.8.6 is not met, 10 CFR 50.36(c)(2)(i) requires the licensee to shut down the reactor or follow any remedial action permitted by the TS until the LCO is met. Based on the TS 3.8.6 Bases, the TS LCO 3.8.6 ensures the availability of the dc power required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated design basis accident. Thus, meeting the TS LCO 3.8.6 provides assurance that the required batteries will be provided for all facility operating modes to permit the performance of safety functions and other vital functions, even in the event of a single failure, as required, in part, by AEC draft GDCs 24 and 39 and GDC 17.

3.1 Proposed Revised TS 3.8.6 Condition B

The licensee proposed revising the existing Browns Ferry TS 3.8.6 Condition B by deleting the third criterion, which states, "One or more batteries with one or more battery cell parameters not within Category C values," and its associated connector "OR."

In its July 21, 2021 letter, the licensee stated that the third criterion of TS 3.8.6 Condition B is largely redundant to the first criterion, which states, "Required Action and associated Completion Time of Condition A not met." The licensee explained that this is because the first criterion would be entered if Required Actions A.1 or A.2 were not met when Category C limits were also not met. Thus, the associated battery would be declared inoperable under Condition B when the Category C limits are not met, even if the third criterion were deleted. The only difference is that the Category A or B limits would also have to not be met, but, as discussed below, the staff found this to be acceptable.

The NRC staff finds that because Condition B, as revised, would address not meeting the Category C limits when the Category A or B limits are not met, the revised Condition B, along with the associated Required Actions and Completion Times, would continue to provide acceptable remedial actions as specified in 10 CFR 50.36(c)(2)(i) to ensure that the required batteries are capable of performing their safety functions. Therefore, the NRC staff finds the proposed change to TS 3.8.6 Condition B acceptable.

3.2 Proposed New Note (e)

The licensee proposed adding a new Note (e), which would state, "Category C battery cell parameters are considered met when the corresponding Category B cell parameters are met," to TS Table 3.8.6-1.

Under the existing Browns Ferry TS 3.8.6, pursuant to the third criterion of Condition B, when any of the Category C limits in Table 3.8.6-1 are not met, even while the Categories A and B limits are met, the battery is required to be declared inoperable immediately. The TS 3.8.6 Bases state that the Category C limit (i.e., not more than 0.020 below average of all connected cells) for a connected cell specific gravity "ensures that the effect of a highly charged or new cell does not mask overall degradation of the battery." In Section 2.3 of its August 6, 2020 letter, however, the licensee discussed a specific case when having one cell more than 0.020 below a high average of all connected cells would not necessarily be an indication of a battery's degradation. This could occur when the average specific gravity of all connected cells was high (e.g., above 1.22) and a normally functioning and fully charged cell whose parameters meet the Category B limits (i.e., ≥ 1.195) was more than 0.020 below the high average due to the natural variance in specific gravity. In such cases, the third criterion of the existing Condition B would require the battery to be immediately declared inoperable even though the battery would not be degraded and would still have adequate capacity to perform its safety function. To correct this situation, the licensee stated that the proposed new Note (e) would clarify the usage of the Category C limits as allowable values that determine the battery's operability only if any of the corresponding Category B limits are not met.

In its July 21, 2021 letter, the licensee stated that the proposed new Note (e) would be used to verify if the Category B limits are met while performing Required Actions A.1 and A.2 in Condition A. When Category A limits and/or Category B limits are not met, the licensee provided the following discussion regarding the use of proposed new Note (e):

When Category A limits are not met, Condition A is entered. Action A.1 requires verification within 1 hour that electrolyte level and float voltage meet Category C limits. Action A.2 requires verification within 24 hours that the battery cell parameters meet the Category C limits. When performing these actions, the new Note (e) is used to first verify that the Category B limits are met. If the Category B limits are met, the corresponding Category C limits are met as well and Action A.3 controls at that point.

If the Category B limits are not met, the Category C limits are verified to be met. If the Category C limits are met, Action A.3 controls at this point. If the Category C limits are not met, then Condition B is entered with the Required Action A not met. Required Action B.1 requires the associated battery to be declared inoperable with an immediate Completion Time.

The NRC staff notes that the proposed new Note (e) would allow using the Category B limits to determine the operability of the battery. The NRC staff finds that meeting the Category B limits ensures that the battery has enough capacity to perform its safety function. Should Category B limits not be met, the licensee will be required to verify Category C allowable values and take action as directed by TS 3.8.6. Therefore, the NRC staff finds that the proposed new Note (e) provides an acceptable action, pursuant to 10 CFR 50.36(c)(2)(i), to ensure that the required batteries can perform their safety functions, and is, thus, acceptable.

3.3 Technical Conclusion

The NRC staff reviewed the licensee's analysis provided in its submittal dated August 6, 2020, as supplemented by letter dated July 21, 2021. The NRC staff determined that, with the proposed changes to Condition B and Table 3.8.6-1, Browns Ferry TS 3.8.6 would continue to provide acceptable remedial actions such that the batteries can perform their required safety functions during all modes of operation. Therefore, the NRC staff concludes that the requirements of 10 CFR 50.36(c)(2)(i) and the applicable design criteria in draft AEC GDCs 24 and 39 and GDC 17 will continue to be met and, thus, the proposed changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Alabama State official was notified of the proposed issuance of the amendments on August 2, 2021. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to the installation or use of facility 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 NRC has previously issued a proposed finding that the amendments involve no significant hazards consideration in the *Federal Register* on October 6, 2020 (85 FR 63149), 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: A. Foli, NRR

Date: August 30, 2021

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 – ISSUANCE OF AMENDMENT NOS. 318, 341, AND 301 REGARDING CHANGES TO TECHNICAL SPECIFICATION 3.8.6, “BATTERY CELL PARAMETERS” (EPID L-2020-LLA-0177) DATED: AUGUST 30, 2021

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DATE	8/5/2021	8/4/2021	7/29/2021	8/5/2021
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