



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

October 5, 2011

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

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 – ISSUANCE OF AMENDMENTS TO REVISE THE TECHNICAL SPECIFICATIONS TO EXTEND THE EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE TIME (TAC NOS. ME5036, ME5037, AND ME5038) (TS-468)

Dear Mr. Krich:

The Commission has issued the enclosed Amendment Nos. 280, 307, and 266 to Renewed Facility Operating Licenses 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 November 12, 2010, as supplemented on February 8, May 27, June 15, and August 19, 2011.

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

Sincerely,

A handwritten signature in black ink, appearing to read "C. Gratton", written over a white background.

Christopher Gratton, Senior 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. 280 to DPR-33
2. Amendment No. 307 to DPR-52
3. Amendment No. 266 to DPR-68
4. Safety Evaluation

cc w/enclosures: Distribution via 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. 280  
Renewed License No. DPR-33

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 12, 2010, as supplemented on February 8, May 27, June 15, and August 19, 2011, 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-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. 280, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Operating License  
and Technical Specifications

Date of Issuance: October 5, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 280  
RENEWED FACILITY OPERATING LICENSE NO. DPR-33  
DOCKET NO. 50-259

Replace Page 3 of Renewed Operating License DPR-33 with the attached Page 3.

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.

REMOVE

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INSERT

3.8-2  
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3.8-3a

- (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 3458 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 280, 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)	<p>A.2 Declare required feature(s) with no offsite power available inoperable when the redundant required feature(s) are inoperable.</p> <p><u>AND</u></p> <p>A.3 Restore required offsite circuit to OPERABLE status.</p>	<p>24 hours from discovery of no offsite power to one shutdown board concurrent with inoperability of redundant required feature(s)</p> <p>7 days</p> <p><u>AND</u></p> <p>21 days from discovery of failure to meet LCO</p>
B. One required Unit 1 and 2 DG inoperable.	<p>B.1 Verify power availability from the offsite transmission network.</p> <p><u>AND</u></p>	<p>1 hour</p> <p><u>AND</u></p> <p>Once per 8 hours thereafter</p> <p>(continued)</p>

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Evaluate availability of both temporary diesel generators (TDGs).	1 hour  <u>AND</u>  Once per 12 hours thereafter
	<u>AND</u>  B.3 Declare required feature(s), supported by the inoperable Unit 1 and 2 DG, inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u>  B.4.1 Determine OPERABLE Unit 1 and 2 DG(s) are not inoperable due to common cause failure.	24 hours
	<u>OR</u>  B.4.2 Perform SR 3.8.1.1 for OPERABLE Unit 1 and 2 DG(s).	24 hours
	<u>AND</u>	(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.5 Restore Unit 1 and 2 DG to OPERABLE status.	7 days from discovery of unavailability of TDG(s)  <u>AND</u>  24 hours from discovery of Condition B entry $\geq$ 6 days concurrent with unavailability of TDG(s)  <u>AND</u>  14 days  <u>AND</u>  21 days from discovery of failure to meet LCO

(continued)



UNITED STATES  
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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. 307  
Renewed License No. DPR-52

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 12, 2010, as supplemented on February 8, May 27, June 15, and August 19, 2011, 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. 307, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "Douglas A. Broaddus". The signature is written in a cursive style with a large initial "D".

Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Operating License  
and Technical Specifications

Date of Issuance: October 5, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 307  
RENEWED FACILITY OPERATING LICENSE NO. DPR-52  
DOCKET NO. 50-260

Replace Page 3 of Renewed Operating License DPR-52 with the attached Page 3.

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.

REMOVE

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INSERT

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3.8-3  
3.8-3a

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 3458 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 307, 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 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)	<p>A.2 Declare required feature(s) with no offsite power available inoperable when the redundant required feature(s) are inoperable.</p> <p><u>AND</u></p> <p>A.3 Restore required offsite circuit to OPERABLE status.</p>	<p>24 hours from discovery of no offsite power to one shutdown board concurrent with inoperability of redundant required feature(s)</p> <p>7 days</p> <p><u>AND</u></p> <p>21 days from discovery of failure to meet LCO</p>
B. One required Unit 1 and 2 DG inoperable.	<p>B.1 Verify power availability from the offsite transmission network.</p> <p><u>AND</u></p>	<p>1 hour</p> <p><u>AND</u></p> <p>Once per 8 hours thereafter</p> <p>(continued)</p>

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Evaluate availability of both temporary diesel generators (TDGs).	1 hour  <u>AND</u>  Once per 12 hours thereafter
	<u>AND</u>  B.3 Declare required feature(s), supported by the inoperable Unit 1 and 2 DG, inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u>  B.4.1 Determine OPERABLE Unit 1 and 2 DG(s) are not inoperable due to common cause failure.	24 hours
	<u>OR</u>  B.4.2 Perform SR 3.8.1.1 for OPERABLE Unit 1 and 2 DG(s).	24 hours
	<u>AND</u>	(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.5 Restore Unit 1 and 2 DG to OPERABLE status.	7 days from discovery of unavailability of TDG(s)  <u>AND</u>  24 hours from discovery of Condition B entry $\geq$ 6 days concurrent with unavailability of TDG(s)  <u>AND</u>  14 days  <u>AND</u>  21 days from discovery of failure to meet LCO

(continued)



UNITED STATES  
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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. 266  
Renewed License No. DPR-68

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 12, 2010, as supplemented on February 8, May 27, June 15, and August 19, 2011, 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. 266, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Operating License  
and Technical Specifications

Date of Issuance: October 5, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 266  
RENEWED FACILITY OPERATING LICENSE NO. DPR-68  
DOCKET NO. 50-296

Replace Page 3 of Renewed Operating License DPR-68 with the attached Page 3.

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.

REMOVE

3.8-2  
3.8-3  
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INSERT

3.8-2  
3.8-3  
3.8-3a

- (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 3458 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 266 , 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)	<p>A.2 Declare required feature(s) with no offsite power available inoperable when the redundant required feature(s) are inoperable.</p> <p><u>AND</u></p> <p>A.3 Restore required offsite circuit to OPERABLE status.</p>	<p>24 hours from discovery of no offsite power to one shutdown board concurrent with inoperability of redundant required feature(s)</p> <p>7 days</p> <p><u>AND</u></p> <p>21 days from discovery of failure to meet LCO</p>
B. One required Unit 3 DG inoperable.	<p>B.1 Verify power availability from the offsite transmission network.</p> <p><u>AND</u></p>	<p>1 hour</p> <p><u>AND</u></p> <p>Once per 8 hours thereafter</p> <p>(continued)</p>

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Evaluate availability of both temporary diesel generators (TDGs).	1 hour  <u>AND</u>  Once per 12 hours thereafter
	<u>AND</u>  B.3 Declare required feature(s), supported by the inoperable Unit 3 DG, inoperable when the redundant required feature(s) are inoperable.	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
	<u>AND</u>  B.4.1 Determine OPERABLE Unit 3 DG(s) are not inoperable due to common cause failure.	24 hours
	<u>OR</u>  B.4.2 Perform SR 3.8.1.1 for OPERABLE Unit 3 DG(s).	24 hours
	<u>AND</u>	(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.5 Restore Unit 3 DG to OPERABLE status.	<p>7 days from discovery of unavailability of TDG(s)</p> <p><u>AND</u></p> <p>24 hours from discovery of Condition B entry <math>\geq</math> 6 days concurrent with unavailability of TDG(s)</p> <p><u>AND</u></p> <p>14 days</p> <p><u>AND</u></p> <p>21 days from discovery of failure to meet LCO</p>

(continued)



UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 280 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 307 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 266 TO RENEWED FACILITY OPERATING LICENSE NO. 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 November 12, 2010 (Agencywide Documents Access and Management System Accession (ADAMS) Accession No. ML103210334), as supplemented by letters dated February 8, May 27, June 15, and August 19, 2011 (ADAMS Accession Nos. ML110450256, ML11152A167, ML11171A209, and ML11234A177), the Tennessee Valley Authority (TVA, the licensee) submitted a request for changes to the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3 Technical Specifications (TSs). The proposed changes would extend the Completion Time (CT) specified in TS 3.8.1, "AC Sources – Operating," for Emergency Diesel Generators (EDGs) A, B, C, D, 3A, 3B, 3C, and 3D from 7 days to 14 days when one EDG is inoperable, provided a supplemental power source is available during the CT extension period.

The supplements dated February 8, May 27, June 15, and August 19, 2011, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on December 14, 2010 (75 FR 77917).

2.0 REGULATORY EVALUATION

2.1 BFN Units 1, 2, and 3, Electrical Power System

Offsite power is delivered to the site via seven 500 kiloVolt (kV) and two 161 kV transmission lines; these lines feed a 500 kV switchyard and a 161 kV switchyard. The 500 kV switchyard is designed to minimize the effects of the failure of individual items of equipment so any single event will not prevent the 500 kV switchyard from providing offsite power to the plant safety buses. A Unit Main

Enclosure

Transformer and two Unit Station Service Transformers provide 4.16 kV station service for each unit. Auxiliary power is also available through the two common station service transformers that are fed from the 161 kV system.

All alternating current (AC) loads necessary for the safe shutdown of the plant under nonaccident and accident conditions can be fed from the onsite standby AC power supply system. The onsite standby AC supply system includes four EDGs (A, B, C, and D) (licensee documents refer to these components as DGs) that supply unitized power to Units 1 and 2, and four EDGs (3A, 3B, 3C, and 3D) that supply unitized power to Unit 3 electrical loads. The eight EDGs provide a standby power supply upon loss of the normal auxiliary power system supplies. Each of the EDGs is assigned to one 4.16 kV Shutdown Board. Provision is made for the interconnection of 4.16 kV Shutdown Board A (Units 1/2) with 4.16 kV Shutdown Board 3EA (Unit 3). Similar interconnections have been provided between Units 1/2 and Unit 3 boards B and 3EB, C and 3EC, and D and 3ED. It is possible to make any EDG available to any 4.16 kV Shutdown Board by using the 4.16 kV Bus Tie Board.

The station blackout (SBO) duration for each BFN unit is 4 hours. At BFN, for a postulated SBO, when two EDGs fail that normally feed a respective unit's shutdown boards concurrent with loss-of-offsite power (LOOP), the blacked-out unit will be shutdown with equipment powered from 250 Volt (V) direct current (DC) battery system. Alternate AC power from an EDG in the non-blacked out units, will be made available to power additional required heating, ventilation, and air conditioning (HVAC) and common loads. The 250 V DC unit batteries 1, 2, and 3 are adequate to supply the required Units 1, 2, and 3 loads for the coping duration of 4 hours.

## 2.2 Proposed TS Changes

The CT of Required Action B.4 of TS 3.8.1 currently allows only 7 days to perform maintenance, testing, or troubleshooting and repair of an EDG, and return it to an operable status when BFN Unit 1, 2, or 3 is in Modes 1-3. In the November 12, 2010, license amendment request (LAR), the licensee stated that recent experience has shown that the current 7-day CT is insufficient to support extensive troubleshooting, maintenance, and post maintenance testing; examples include the 12-year preventive maintenance (PM) activities and Lube Oil System Modification, while a unit is at power. The extension of the 7-day DG CT to 14 days would provide extra time for completing the PM activities, and thus reduces the potential of a TS forced reactor shutdown. It is possible to partition the 12-year DG mechanical PM and electrical PM into two maintenance activities. However, this is not desirable from an overall DG availability perspective since this approach removes the DGs from service for a longer period of time than if performed as a combined activity.

Consistent with the Nuclear Regulatory Commission (NRC) staff's technical position for maintaining defense-in-depth when requesting to extend the CT for an inoperable EDG, the licensee proposed an alternate power source consisting of two Temporary Diesel Generators (TDGs) with paralleled output to supply power to any of the eight engineered safety feature (ESF) buses (4.16 kV Shutdown Boards) via the 4.16 kV Tie Bus. The TDGs would supply power to only one ESF bus at a time, providing an alternate supply of AC power that could be used to bring a unit to cold shutdown, if required. The combined capacity of both TDGs exceeds that of any permanent EDG. This capacity meets or exceeds the LOOP loads in any unit in the event other sources of power become unavailable during an extended CT.

According to the LAR and subsequent supplements, the licensee will evaluate the availability of both TDGs within 1 hour of removing an EDG from service for maintenance that is expected to exceed the normal 7-day CT. If one or both TDGs become unavailable greater than or equal to 6 days into the CT, then action will be taken to restore the unavailable TDG(s) to available status within 24 hours.

The specific proposed TS changes are as follows:

TS 3.8.1 – New Required Action B.2 – This is to evaluate the availability of both TDGs. The proposed CTs are 1 hour and once per 12 hours thereafter.

TS 3.8.1 – CT - Required Action B.4 – Current Required Action B.4 is proposed to be renumbered as B.5 and extended from 7 days to 14 days only when TDGs are available. In addition, the licensee is proposing to eliminate a reference to a historical footnote from the CT of TS 3.8.1, Required Action B.4 for BFN Unit 3, as this footnote refers to a one-time extension that has expired. The elimination of this footnote is an administrative change with no impact on safety.

TS 3.8.1 – Maximum CT – Required Action A.3 and B.5 – The maximum CT for current Required Action A.3 and B.5 is proposed to be extended from 14 days to 21 days. This limits the total time that Limiting Condition for Operation (LCO) 3.8.1 is not met while concurrently or simultaneously in Condition A and B. This is a consequential change due to the proposed extension of CT of an EDG from 7 days to 14 days (an increase of 7 days).

TS 3.8.1 – Required Action B.5 – The licensee will have the TDGs available prior to entering the entire period of extended outage time for the EDGs. The revised TS will limit unavailability of the TDGs to 24 hours, starting on the 6th day of the 14-day extended CT.

The licensee's application included a provision to apply the extended completion time to unplanned EDG outages where the repair was expected to exceed 7 days. In a letter dated August 19, 2011, the licensee stated that it would not use the extended completion time for unplanned EDG outages. As such, the NRC staff's review only considered planned EDG outages expected to last greater than 7 days.

### 2.3 Regulatory Requirements and Guidance

The following explains the applicability of general design criteria (GDC) for BFN Units 1, 2, and 3. The construction permits were issued by the Atomic Energy Commission (AEC) on May 10, 1967, for Units 1 and 2, and on July 31, 1968, for Unit 3. The operating licenses were issued on December 20, 1973, August 2, 1974, and August 18, 1976 for Units 1, 2, and 3, respectively. The plant GDC are listed in the Final Safety Analysis Report (FSAR) Appendix A, "Conformance to AEC Proposed General Design Criteria," with more details given in the applicable updated FSAR (UFSAR) sections. In accordance with an NRC staff requirements memorandum from S. J. Chilk to J. M. Taylor, "SECY-92-223 - Resolution of Deviations Identified during the Systematic Evaluation Program," dated September 18, 1992 (ADAMS Accession No. ML003763736), the Commission decided not to apply the Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, GDC to plants with construction permits issued prior to May 21, 1971. Therefore, the GDC that constitute the licensing bases for BFN Units 1, 2, and 3, are those in the

UFSAR. The staff identified the following AEC GDC as being applicable to the proposed amendment.

AEC GDC 24 [BFN FSAR, Appendix A], "Emergency Power for Protection System," states that 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. The facility is supplied with normal and emergency power to provide for the required functioning of the protection system. In the event of a reactor and turbine trip, emergency power is supplied by a set of redundant diesel generators per unit, as described in Section 8 of the FSAR.

AEC GDC 39 [BFN FSAR, Appendix A], "Emergency Power for Engineered Safety Features (ESF)," states that alternate power systems shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning required of the ESF. As a minimum, the onsite power system and offsite power system shall each, independently, provide this capacity assuming a failure of a single active component in each power system.

The NRC staff also used the following regulations and guidance documents to review the licensee's amendment request:

GDC 3, "Fire Protection," of Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, requires, in part, that structures, systems, and components (SSCs) important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Further, fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on SSCs important to safety.

GDC 17, "Electric power systems," of Appendix A to 10 CFR Part 50, requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions.

GDC 18, "Inspection and testing of electric power systems," requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing of important areas and features, such as wiring, insulation, connections, and switchboards to assess the continuity of the systems and the condition of their components.

In 10 CFR 50.36, "Technical specification," the Commission established its regulatory requirements related to the content of the TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements; (4) design features; and (5) administrative controls. The rule does not specify the particular requirements to be included in a plant's TSs.

As described in 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. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any

**remedial action** [emphasis added] permitted by the TSs until the condition can be met. The LCO Action requirements establish those remedial actions that must be taken when the requirements of an LCO are not met. There are two basic types of Action requirements. The first type specifies a time limit (referred to as an AOT [Allowed Outage Time] or a Completion Time, during which the LCO may not be met). This time limit provides for restoration of an inoperable system or component to operable status or to restore variables to within specified limits. If this type of Action requirement is not completed within the specified AOT, a shutdown may be required to place the unit in a mode or condition in which the LCO is not applicable. The second type of Action requirement specifies the remedial measures that permit continued operation of the unit that is not further restricted by the AOT. In this case, compliance with the Action requirements provides an acceptable level of safety for continued operation.

As stated by 10 CFR 50.48, "Fire protection," each holder of an operating license must have a fire protection plan that satisfies General Design Criterion 3 of Appendix A to 10 CFR Part 50.

As stated by 10 CFR 50.65(a)(3), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," licensees are required to evaluate performance and condition monitoring activities and associated goals and preventive maintenance activities, taking into account, where practical, industry-wide operating experience. Further, adjustments shall be made where necessary to ensure that the objective of preventing failures of structures, systems, and components through maintenance is appropriately balanced against the objective of minimizing unavailability of structures, systems, and components due to monitoring or preventive maintenance.

As stated by 10 CFR 50.63, "Loss of all alternating current power," a nuclear power plant must be able to withstand for a specified duration and recover from a complete loss of offsite and onsite AC sources (i.e., an SBO).

Regulatory Guide (RG) 1.93, "Availability of Electric Power Sources," provides guidance with respect to operating restrictions or CT if the number of available AC sources is less than that required by the TS LCO. In particular, this guide prescribes a maximum CT of 72 hours for an inoperable onsite or offsite AC source.

RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," dated August 1998 (ADAMS Accession No. ML003740176), describes an acceptable risk-informed approach for assessing proposed changes to TS AOTs. While the staff did not use risk insights in its evaluation of the proposed changes, RG 1.177 includes guidance on performing a deterministic evaluation, which the staff used to evaluate this change.

NUREG-1784, "Operating Experience Assessment - Effects of Grid Events on Nuclear Power Plant Performance," dated December 2003 (ADAMS Accession No. ML033530400), provided an assessment to identify changes to electric grid performance, relative to nuclear power plants, which could impact safety. The assessment found that major changes related to LOOPs after deregulation compared to before include the following: (1) the frequency of LOOP events at nuclear power plants has decreased; (2) the average duration of LOOP events has increased; (3) where before LOOPs occurred more or less randomly throughout the year, for 1997-2001, most LOOP events occurred during the summer; and (4) the probability of a LOOP as a consequence of a reactor trip has increased.

NUREG/CR-6890, Volumes 1-3, "Reevaluation of Station Blackout Risk at Nuclear Power Plants," dated December 2005 (ADAMS Accession Nos. ML060200477, ML060200479, and ML060200510), analyzed LOOP events and associated SBO core damage risk at United States commercial nuclear power plants. The analyses documented in Volume 1 indicated that, on average, LOOP events lasted longer in 1997 - 2004 than in 1986 - 1996.

NUREG-0800, Branch Technical Position 8-8, "Onsite Emergency Diesel Generators (EDGs) and Offsite Power Sources Allowed Outage Time Extensions," dated May 2011 [Initial issue for public comments; ADAMS Accession No. ML111180521] provides guidance to the NRC staff in reviewing LARs for licensees proposing a permanent TS change to extend an EDG AOT beyond 72 hours.

The NRC issued a license for Unit 1 to operate on December 20, 1973; Unit 2 was licensed to operate on August 2, 1974; and Unit 3 was licensed to operate on August 18, 1976, thus, the licensee is required to meet Section III.G of 10 CFR Part 50, Appendix R (which applies to plants operating prior to January 1, 1979) for BFN Units 1, 2, and 3. Section III.G of Appendix R requires that one train of systems necessary to achieve and maintain hot shutdown conditions be free of fire damage. Typically, a change to safe shutdown capability (as provided in Section III.G of Appendix R) requires an exemption from the regulation. However, this change modifies EDG AOTs, which are not governed by the fire protection program; therefore, the regulatory context for this review is conducted under the EDG TSs. (A fire protection technical evaluation still applies, and is included below, due to the potential impact on the plant's fire protection program.)

NRC Commission Paper SECY-00-0045, dated February 22, 2000 (ADAMS Accession No. ML003679799), informed the Commission that Nuclear Energy Institute (NEI) guidance document NEI 99-04, "Guidelines for Managing NRC Commitments," offered an acceptable way to manage commitments. SECY-00-0045 also stated that the definitions and other guidance in NEI 99-04 are consistent with the principles described in SECY-98-224. NRC Commission Paper SECY-98-224, "Staff and Industry Activities Pertaining to the Management of Commitments Made by Power Reactor Licensees to the NRC," dated September 28, 1998 (ADAMS Accession No. ML992870043), stated that "[t]he imposition of obligations (sometimes referred to as regulatory requirements) during routine interactions with licensees should be reserved for matters that satisfy the criteria of 10 CFR 50.36 or are otherwise found to be of high safety or regulatory significance." The major distinction between obligations and other parts of the licensing basis is that changes to regulatory requirements (obligations) generally cannot be made without prior NRC approval.

Office of Nuclear Reactor Regulation (NRR), Office Instruction LIC-100, "Control of Licensing Bases for Operating Reactors," January 7, 2004, ensures that interactions between the staff, licensees, and other parties are conducted with mutual understanding of the terminology and characteristics of various documents that make up the licensing bases for an operating nuclear power plant. Specifically, regulatory commitments are explicit statements to take a specific action agreed to, or volunteered by, a licensee and submitted in writing on the docket to the NRC. A regulatory commitment is appropriate for matters in which the staff has a significant interest but which do not warrant either a legally binding requirement or inclusion in the UFSAR or a program subject to a formal regulatory change control mechanism. Control of such commitments in accordance with licensee programs is acceptable provided those programs include controls for evaluating changes and, when appropriate, reporting them to the NRC.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Defense-in-Depth

Consistent with the discussion in Regulatory Position 2.2.1 of RG 1.177, as part of an LAR proposing an AOT change, the licensee should assess whether the change is consistent with the defense-in-depth philosophy. The defense-in-depth philosophy has traditionally been applied in reactor design and operation to provide multiple means to accomplish safety functions and prevent the release of radioactive material.

Several studies have been performed (e.g., NUREG-1784 and NUREG/CR-6890, discussed in safety evaluation (SE) Section 2.3) which concluded that the average duration of LOOP events has increased from the durations assumed at the time of issuance of the SBO rule. Based on this issue, as well as the reliance on the EDGs to support the Residual Heat Removal Low Pressure Coolant Injection mode of operation, the NRC staff concluded during its review that additional defense-in-depth in the form of a supplemental power source was warranted if an extension of an EDG's AOT was to be considered.

In an earlier application dated February 18, 2010, the licensee initially proposed to extend the completion time for an inoperable EDG from 7 to 14 days using a risk-informed justification that did not include a supplemental power source. On June 29, 2010, the NRC staff held a public meeting with the licensee to discuss the proposed amendment (ADAMS Accession No. ML103130153). On November 12, 2010, the licensee submitted a revised application that superseded the initial application in its entirety. The licensee used a deterministic basis in justifying the AOT extension in the revised application and included crediting a supplemental AC power source (i.e., a pair of TDGs) to enhance defense-in-depth, supplementing the existing EDGs during the proposed extended 14-day AOT.

##### 3.1.1 Temporary Diesel Generator Design

The proposed supplemental AC power source consists of two TDGs each rated 1.62 Megawatts electric (MWe) that synchronize with each other automatically, supplying power in parallel to the 4.16 kV Bus Tie Board. The combined capacity of the two TDGs is 3.24 MWe, which is greater than the 2.6 MWe rating of the largest BFN permanent EDG. The licensee stated in its letter dated May 27, 2011, that if an EDG is in the extended CT period and other power sources are not available, the TDGs have sufficient capacity such that the affected unit can achieve cold shutdown. The TDGs are commercial grade, nonsafety related portable units, and will be installed inside the plant protected area. The licensee stated in its letter dated February 8, 2011, that the TDGs' voltage rating is 480 V. The two TDGs will be connected to the 4.16 kV Bus Tie Board via aboveground cables, via a 480 V/4.16 kV step-up transformer, and then through Manhole "E" via underground cables. The aboveground cable from TDGs to Manhole "E" will be protected from both pedestrians and vehicular traffic with barricades and signs. Manhole "E" has a sump pump in it and is monitored by the plant's preventive maintenance program.

The TDG components will be physically separated from the safety-related Class 1E ESF components, separated from the permanent EDGs and separated from the two offsite power sources for all the BFN units. The TDGs will be separated from the Class 1E power system by three manually operated, normally open circuit breakers wired in a series configuration. Following

a loss of AC power to any 4.16 kV Shutdown Board, the TDGs can be started and supply power to the required Shutdown Board. The licensee stated that the configuration, procedures and staffing will ensure that this can be accomplished within an estimated time of 30 minutes. According to the FSAR, the SBO coping duration for BFN units is 4 hours. The plant has procedures and adequate battery capacity to maintain hot shutdown conditions for 4 hours. Therefore, the NRC staff finds reasonable assurance that supplemental AC power from the TDGs will be available within 1 hour (the NRC staff's expectation for aligning the supplemental source when crediting the source for AOT extensions), which is within the coping time analyzed by the licensee for SBO.

The NRC staff also concludes that TDG design includes sufficient capacity to achieve cold shutdown which is consistent with a defense-in-depth philosophy. The TDG design also provides adequate separation from the Class 1E ESF components, onsite EDGs, and offsite power sources, while remaining available for use within 1 hour, if needed.

### 3.1.2 Parallel Operation of the two TDGs, load sharing and load test

The licensee, in its letter dated February 8, 2011, stated that TDG load testing will use a resistive load bank. The TDG loading, however, will comprise of both resistive and reactive loads, as the TDGs will be connected to large motors. Since the resistive load testing cannot simulate the reactive load characteristics, the NRC staff requested that the licensee demonstrate the capability of the TDGs to supply large reactive power to the motors required during starting while meeting the steady state power requirements of other expected loads connected to the TDGs. In response to the staff's request for additional information, the licensee stated in its letter dated May 27, 2011, that both TVA and the TDG supplier have verified through analysis of design data that the TDGs' reactive power output exceeds the capability of a single permanent EDG. The TDG supplier also has documented the load sharing feature of the TDGs. Both TDGs are identical in their design and have load sharing microprocessor load programming, so that each generator will provide 50 percent of the real (kilowatt) and reactive power (kV ampere reactive) demanded by the loads. The NRC staff finds that, with regard to the parallel operation of the TDGs, load sharing and load tests, the licensee's response provides reasonable assurance that the TDGs will be capable of providing adequate and balanced AC power to the equipment necessary for the affected unit to achieve cold shutdown.

### 3.1.3 TDG Housing and Fuel Supply

Each TDG will be housed in a trailer mounted enclosure, complete with a 1000 gallon day tank for 10 hour operation at 100 percent rated capacity. The licensee will have an additional 8 days of on-site fuel supply in the fuel oil storage tanks (FOSTs). The two FOSTs are located approximately 700 feet away from the TDGs and fuel oil will be transferred via hoses connecting the FOSTs to the TDG day tanks. Each TDG has an internally mounted fuel transfer pump, powered by the TDG 480 V output power while the TDG is running. An external lubrication oil reservoir is provided for the TDGs for 80 hours of continuous operation and will automatically replenish the engine oil. The TDGs can run for 28 continuous days before being shutdown for oil and filter change. The TDGs will be continuously manned during any period that they are required to be available while an EDG is in the extended AOT (i.e., after the 7th day) to ensure reliable operation and equal load sharing between the two TDGs. Prior to and during a planned extended maintenance outage of an EDG, plant operators will replenish fuel oil, monitor the functionality of the TDG starting batteries (charging status), and provide an additional level of TDG overall monitoring. The NRC staff finds that the licensee's response provides reasonable assurance that

the TDGs will be capable of accomplishing the cold shutdown function normally performed by the EDGs during the extended CT.

Based on the discussions in Section 3.1.1 through 3.1.3, the NRC staff concludes that the TDGs' design offers reasonable assurance that they can be used to bring the affected unit to cold shutdown, if needed. As such, the staff further concludes that the TDGs provide an alternate means of accomplishing the cold shutdown functions normally provided by the EDGs. Therefore, the staff finds the proposed change is consistent with the defense-in-depth philosophy.

### 3.2 Safety Margins

Consistent with the discussion in Regulatory Position 2.2.2 of RG 1.177, as part of an LAR proposing an AOT change, the licensee should assess whether the change is consistent with the principle that sufficient safety margins are maintained. As discussed in the RG, sufficient safety margins are maintained when:

- The proposed TS change is not in conflict with approved Codes and standards relevant to the subject system.
- Safety analysis acceptance criteria in the UFSAR are met, or proposed revisions provide sufficient margin to account for analysis and data uncertainties (i.e., the proposed TS change does not adversely affect any assumptions or inputs to the safety analysis, or, if such inputs are affected, justification is provided to ensure sufficient safety margins will continue to exist). For TS AOT changes, an assessment should be made of the effect of the UFSAR acceptance criteria assuming the plant is in the AOT (i.e., the subject equipment is inoperable) and there are no additional failures. Such an assessment should result in the identification of all situations in which entry into the proposed AOT could result in failure to meet an intended safety function.

In its November 12, 2010, application the licensee stated, regarding the meeting of Codes and standards, "The design and operation of the [E]DGs are not altered by the proposed extensions in the CTs. Redundancy and diversity of the electrical distribution system will be maintained, because the system design and operation are not altered by the proposed extensions to the CTs." Therefore, with respect to the first consideration discussed above, the proposed AOT extension is not in conflict with any Codes and standards relevant to the EDGs.

With respect to the second consideration discussed above, the licensee stated in its application dated November 12, 2010, that only one of eight EDGs will be taken out of service at a time for a planned EDG inoperability that exceeds 7 days, and that the other EDGs would be protected and available in addition to the two TDGs. Testing or maintenance on protected equipment required during the extended AOT would be managed in accordance with section 10 CFR 50.65(a)(4) of the Maintenance Rule.

As discussed in BFN UFSAR Section 8.5, it is possible, through breaker ties to the shutdown buses, to make any EDG available to any 4.16-kV shutdown board, ensuring the capability of shutting down the plant safely, maintaining the plant in a safe shutdown condition, and mitigating the consequences of accident conditions. All AC loads necessary for the safe shutdown of the plant under accident or nonaccident conditions are fed from this distribution system. The licensee

stated in its November 12, 2010, application that the safety analysis acceptance criteria stated in the UFSAR are not impacted by the change. The proposed change will not allow plant operation in a configuration outside the design basis. The requirements regarding the EDGs credited in the accident analysis will remain the same.

Based on the above considerations, the NRC staff concludes that the proposed change maintains sufficient safety margins.

### 3.3 Performance Measurement Strategies

As discussed in Regulatory Position 3.2 of RG 1.177, to ensure that extension of a TS AOT does not degrade operational safety over time, the licensee should ensure, as part of its Maintenance Rule (MR) program (10 CFR 50.65), that when equipment does not meet its performance criteria, the evaluation required under the MR includes prior related TS changes in its scope. If the licensee concludes that the performance or condition of TS equipment affected by a TS change does not meet established performance criteria, appropriate corrective action should be taken, in accordance with the MR. Such corrective action could include consideration of another TS change to shorten the revised AOT, or imposition of a more restrictive administrative limit, if the licensee determines this is an important factor in reversing the negative trend.

As discussed in Section 3.3.2 of the licensee's application dated November 12, 2010:

The MR requires each licensee to monitor the performance or condition of the [E]DGs to ensure that the [E]DGs are capable of fulfilling its intended functions. If the performance or condition of the [E]DGs do not meet performance criteria, appropriate corrective action is required along with goals to monitor effectiveness of the corrective action.

The actual out of service time for the EDGs is minimized to ensure that the reliability and availability performance criteria are met.

The NRC staff finds that the licensee's performance measurement strategies: (1) provide reasonable assurance that appropriate corrective actions will be taken if EDG performance does not meet its reliability or availability criteria and; (2) are consistent with the requirements in 10 CFR 50.65. As such, the NRC staff concludes that the performance measurement strategies are acceptable.

### 3.4 Compliance with Current Regulations

As discussed in Regulatory Position 2.1 of RG 1.177, the proposed TS change must meet the current regulations.

The NRC staff has reviewed the licensee's proposed amendment. The NRC staff finds that the proposed TS changes provide acceptable remedial actions associated with inoperability of the EDGs. As such, the proposed change meets the requirements of 10 CFR 50.36(c)(2)(i). As discussed in SE Section 3.3, the NRC staff concluded that the proposed change is consistent with the requirements in 10 CFR 50.65. The NRC staff also concludes that the proposed changes do not impact compliance with GDC 17 and 18.

Based on the above, the NRC staff concludes that the proposed amendment meets current regulations.

### 3.5 Fire Protection

The post fire safe shutdown method used at BFN requires use of the EDGs to power safe shutdown equipment in the event of a serious fire in fire areas inside the power block. Should a fire occur in a fire area that affects one EDG, components required for safe shutdown can receive electrical power from one of the unaffected EDGs. The NRC staff requested that the licensee provide a description of the capability to achieve safe shutdown for a fire that affects one diesel, while one of the other diesels is out of service for the extended outage.

As previously described in Sections 3.1.1 through 3.1.3, the licensee will supplement the existing EDGs with TDGs to enhance defense-in-depth during the proposed extended outage period. The TDGs will be available to provide supplemental power to safe shutdown equipment in the event of a serious fire inside the power block.

Since the TDGs and their fuel tanks present a significant fire hazard, the staff questioned the licensee concerning the location and fire protection features of the TDGs and the fuel tanks.

By letter dated June 15, 2011, the licensee provided information that the temporary diesel generators and the associated fuel tanks will be located in the yard area approximately 75 feet from nonsafety structures (Auxiliary Decay Heat Removal Cooling Towers and temporary trailers) and over 150 feet away from any safety-related structure (Reactor Building and Intake Structure). Further, the licensee stated that the fuel tanks meet the UL 142 Standard for "Steel Aboveground Tanks for Flammable and Combustible Liquids," and are intended for installation in accordance with the "Flammable and Combustible Liquids Code," National Fire Protection Association (NFPA) 30; the "Standard for Installation of Oil Burning Equipment," NFPA 31; and the "Automotive and Marine Service Station Code," NFPA 30A.

Each 1000 gallon fuel oil tank will have a metal enclosure capable of containing the volume of the tank. Each TDG has an associated transformer, containing 700 gallons of oil that will have a rigid containment barrier capable of containing the contents of the transformer. The TDGs and transformers will be separated to meet the minimum distance of the guidance of NFPA 30.

BFN has its own fire department and fire truck on site to respond to any fire emergency. The nearest fire hydrant is 60 feet from the planned location of the TDGs.

The licensee fire protection features of the TDGs are consistent with the guidance provided in Section 7.4 of RG 1.189, Revision 2, with the exception of an automatic fire suppression system. The distance from the plant's safety related structures, the presence of the onsite fire department, and proximity of the fire hydrant provide adequate fire protection features for the temporary placement of the TDGs and provide adequate measures to compensate for the absence of an automatic fire suppression system in the area of the TDGs and associated tanks. The NRC staff, therefore, concludes that the fire protection features described above are adequate to satisfy the GDC 3 requirements. Regulatory commitments that mitigate fire risk during the extended AOT are listed in Section 3.7.J of this safety evaluation.

### 3.6 Technical Evaluation Conclusion

Based on the review described in Sections 3.1 through 3.5 above, the NRC staff concludes that the proposed amendment is acceptable.

### 3.7 Licensee Commitments

The licensee made the following regulatory commitments related to the proposed amendment as shown in Enclosure 3 to TVA's letter dated May 27, 2011:

- A. Browns Ferry Nuclear Plant (BFN) "Engineering Procedure for TDGs Initial Acceptance Testing," will direct a load test of the temporary diesel generators (TDGs) initially after acceptance from the TDGs rental vendor and once per 18 months (while the TDGs are in TVA's custody) which loads the pair of TDGs to 3.24 MWe using a resistive load bank. The same procedure will direct routine preventative maintenance and a monthly unloaded test run, while the TDGs are onsite, but only during periods when the TDGs are not credited as available during the extended allowed outage time (AOT). If the TDGs are needed again after being out of TVA control onsite, TVA will re-perform the acceptance testing prior to entering the next planned emergency diesel generator (EDG) inoperability that exceeds 7 days.
- B. The TDGs will be protected, as a defense-in-depth, during the extended AOT, and will be routinely monitored when they are not required to be available for the extended EDG AOT.
- C. Required actions during an AOT greater than 7 days will be to verify the TDGs fuel tanks are at least 90 percent full and to keep one diesel Fuel Oil Storage Tank at least 60 percent full.
- D. Licensed Operators and Assistant Unit Operators will be appropriately trained on the purpose and use of the TDGs and the revised Safe Shutdown Instructions (SSIs). A briefing/discussion of the revised TS 3.8.1 and putting TDGs in service will be completed prior to a planned EDG inoperability that exceeds 7 days. Operating crews will be briefed on the EDG work plan and procedural actions regarding loss-of-offsite power and station blackout (SBO).
- E. Operators will monitor weather forecasts each shift. Weather conditions will be evaluated prior to intentionally entering the extended EDG outage and will not be entered if official weather forecasts are predicting severe conditions (tornado or thunderstorm warnings). If severe weather or grid instability is expected after an EDG outage begins, station managers will assess the conditions and determine the best course for returning the EDG to an operable status.
- F. The Transmission Operator system dispatcher will be contacted once per day and BFN will inform the dispatcher of the EDG status along with BFN offsite power needs. Prior to entering a planned EDG inoperability that exceeds 7 days, BFN Operating Crew will hold discussions with the system load dispatcher to ensure no significant grid perturbations are expected during the planned EDG inoperability that exceeds 7 days, and request that the system load dispatcher inform BFN if offsite power conditions change during a planned EDG inoperability that exceeds 7 days such that significant grid perturbations do occur or become expected.
- G. No discretionary switchyard maintenance will be allowed during the extended EDG maintenance period.

- H. The High Pressure Coolant Injection pump, Reactor Core Isolation Cooling pump, and the Residual Heat Removal pump associated with the operable EDG will not be removed from service for elective maintenance activities during the planned extended EDG AOT.
- I. TS Basis 3.8.1 B.2 is being revised to clarify the frequency requirements for the verification of TDGs availability. The revised wording is below:

In order to extend the Required Action B.5 Completion Time for an inoperable EDG from 7 days to 14 days inoperable, it is necessary to verify the availability of the TDGs within 1 hour on entry into TS 3.8.1 LCO and every 12 hours thereafter.

- J. Compensatory actions for fire protection impairments associated with the Yellow violation will remain in effect. In addition, TVA will implement additional actions that will mitigate fire risk during the extended AOT for each EDG, as follows:
  - 1. TVA will perform a qualitative analysis on electrical circuits/cable routing for each out-of-service (OOS) EDG for the 14-day AOT. This analysis will identify the fire areas where there is a lack of adequate cable separation associated with use of the TDGs. Hourly fire watches will be in effect for these areas. After the 7th day of the extended 14-day AOT, a continuous fire watch will be provided for the fire areas which lack cable separation, as identified in the Qualitative Analysis.
  - 2. TVA will revise the SSIs to incorporate guidance for use of the TDGs as an alternate AC power source for each OOS EDG. Additional or revised operator manual actions associated with the use of the TDGs in the SSIs will be minimized and validated. Actions will include starting the TDGs upon entering any SSI that credits the TDGs as a replacement for an OOS EDG. Operators will be trained on the revised SSIs.
  - 3. After the 7th day of the extended 14-day AOT, an operator will be stationed at the TDGs to start the TDGs when directed, and to ensure reliable operation and equal load sharing of the TDGs.
  - 4. TVA will impose additional restrictions on hot work in the affected fire zones/areas, and on elective work on Appendix R components.
  - 5. Fire Operations personnel will perform walk downs to verify required controls of transient combustibles in affected fire zones/areas that could impact the operable EDGs, the TDGs' availability, offsite power availability, or the ability to use the Bus Tie Board prior to entering and during each shift for the duration of the extended AOT.
- K. Revise appropriate procedures such that the initial emergency equipment cooling water pump is supplied by one of the remaining credited EDGs. The TDGs will be available in time to support the remaining functions which rely on AC power during a SBO.
- L. Procedure 0-SR-3.8.1.1 (OPS TDG Implementation) will include Manhole "E" sump pump monitoring.

The NRC staff finds that the above commitments provide additional assurance as to the adequacy of TVA's SBO defense-in-depth and fire protection program. Further, the staff finds that

The NRC staff finds that the above commitments provide additional assurance as to the adequacy of TVA's SBO defense-in-depth and fire protection program. Further, the staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitments are provided by the licensee's administrative processes, including its commitment management program. The NRC staff has determined, consistent with the guidance in NRR Office Instruction LIC-100, that the commitments do not warrant the creation of regulatory requirements, which would require prior NRC approval of subsequent changes. The NRC staff may choose to verify the implementation and maintenance of these commitments in a future inspection or audit.

#### 4.0 STATE CONSULTATION

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

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (75 FR 77917). Accordingly, the amendment meets 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 amendment.

#### 6.0 CONCLUSION

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

Principal Contributors: S. Som  
P. Qualls

Date: October 5, 2011

October 5, 2011

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

**SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 – ISSUANCE OF AMENDMENTS TO REVISE THE TECHNICAL SPECIFICATIONS TO EXTEND THE EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE TIME (TAC NOS. ME5036, ME5037, AND ME5038) (TS-468)**

Dear Mr. Krich:

The Commission has issued the enclosed Amendment Nos. 280, 307, and 266 to Renewed Facility Operating Licenses 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 November 12, 2010, as supplemented on February 8, May 27, June 15, and August 19, 2011.

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

Sincerely,

*/RA/*

Christopher Gratton, Senior 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. 280 to DPR-33
2. Amendment No. 307 to DPR-52
3. Amendment No. 266 to DPR-68
4. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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