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

December 4, 2015

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 – CORRECTION TO AMENDMENTS REGARDING TRANSITION TO A RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION PROGRAM IN ACCORDANCE WITH 10 CFR 50.48(c) (CAC NOS. MF1185, MF1186, AND MF1187)

Dear Mr. Shea:

On October 28, 2015, the Nuclear Regulatory Commission (NRC) issued Amendment Nos. 290, 315, and 273 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15212A796) to Renewed Facility Operating License (RFOL) Nos. DPR-33, DPR-52, and DPR-68, for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, respectively. The amendments modified the RFOLs and Technical Specifications to incorporate a new fire protection licensing basis in accordance with Title 10 of the *Code of Federal Regulations* Section 50.48(c). The amendments authorized the transition of the licensee's fire protection program to a risk-informed, performance-based program based on the 2001 Edition of National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants."

Subsequently the Tennessee Valley Authority staff notified the NRC staff of typographical errors in pages 4, 167, and B3 of the safety evaluation (SE) associated with the issued amendments. In addition, the NRC staff noticed an inadvertent omission of the word "neutron" from Page 3 of BFN Unit 2 license.

The NRC is issuing this letter to correct the identified errors in accordance with the guidance stated in SECY-96-238, dated January 16, 1997 (ADAMS Legacy Library Accession No. 9611250030), which was approved by the Commission on December 17, 1996, via a Staff Requirements Memorandum (ADAMS Accession No. ML003754054). The NRC staff determined that the errors were introduced during the preparation of the license amendments and are entirely typographical in nature. The corrections do not change any of the conclusions in the SE associated with the amendments and do not affect the associated notice to the public.

Enclosure 1 contains the corrected page 3 of the BFN Unit 2 license. Enclosure 2 contains corrected SE pages 4, 167, and B3. Please use these pages to replace corresponding pages issued by Amendment Nos. 290, 315, and 273 for BFN units.

If you have any questions regarding this matter, please call me at (301) 415-1447.

Sincerely,

Farideh E. Saba, 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. Corrected License Page 3 for Unit 2
2. Corrected Safety Evaluation Pages

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CORRECTION TO LICENSE AMENDMENT NO. 315

RENEWED FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Replace the following page of Renewed Facility Operating License No. DPR-52 with the attached corrected page.

REMOVE	INSERT
3	3

Enclosure 1

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 0 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. 315, 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

CORRECTION TO THE SAFETY EVALUATION ASSOCIATED WITH

AMENDMENT NOS. 290, 315, AND 273 TO RENEWED FACILITY OPERATING

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

Replace the following pages of the Safety Evaluation with the attached corrected pages.

REMOVE	INSERT
4	4
167	167
B3	B3

Enclosure 2

October 6, 2014 (Reference 23); December 17, 2014 (Reference 24); March 26, 2015 (Reference 25); April 9, 2015 (Reference 26); June 19, 2015 (Reference 27), August 18, 2015 (Reference 28), September 8, 2015 (Reference 29), and October 20, 2015 (Reference 30), the licensee submitted an application for license amendments (also called license amendment request (LAR)) to transition the FPP from 10 CFR 50.48(b) to 10 CFR 50.48(c), NFPA 805. The supplemental letters were in response to the NRC staff's requests for additional information (RAIs) dated November 19, 2013 (Reference 31); May 20, 2014 (Reference 32); May 21, 2014 (Reference 33); July 31, 2014 (Reference 34); November 18, 2014 (Reference 35); February 21, 2015 (Reference 36), and May 29, 2015 (Reference 37). The licensee's supplemental letters dated December 20, 2013; January 10, January 14, February 13, March 14, May 30, June 13, July 10, August 14, August 26, August 29, September 16, October 6, and December 17, 2014; and March 26, April 9, June 19, August 18, September 8, and October 20, 2015, provided additional information that clarified the application, did not expand the overall scope of the application as originally noticed, and did not change the staff's original proposed opportunity for a hearing on the initial application as published in the FR on August 13, 2013 (78 FR 49302).

The licensee requested amendments to the BFN RFOLs and TSs to establish and maintain an RI/PB FPP in accordance with the requirements of 10 CFR 50.48(c).

Specifically, the licensee requested to transition BFN from the existing deterministic fire protection licensing basis established in accordance with all provisions of the approved FPP as described in the final safety analysis report (FSAR), as approved in the SEs dated December 8, 1988 (Reference 38); March 31, 1993 (Reference 39); April 1, 1993 (Reference 40); November 2, 1995 (Reference 41); April 25, 2007 (Reference 42); and supplement dated November 3, 1989 (Reference 43), to an RI/PB FPP in accordance with 10 CFR 50.48(c) that uses risk information, in part, to demonstrate compliance with the fire protection and nuclear safety goals, objectives, and performance criteria of NFPA 805. As such, the proposed FPP at BFN is referred to as RI/PB FPP throughout this SE.

In its LAR, the licensee provided a description of the revised FPP for which it is requesting NRC approval to implement, a description of the FPP that it will implement under 10 CFR 50.48(a) and (c), and the results of the evaluations and analyses required by NFPA 805.

This SE documents the NRC staff's evaluation of the licensee's LAR and the NRC staff's conclusion that:

1. The licensee has identified any orders, license conditions, and the TSs that must be revised or superseded, and that any necessary revisions are adequate, as required by 10 CFR 50.48(c)(3)(i);

2. The licensee has completed its implementation of the methodology in Chapter 2, "Methodology," of NFPA 805 (including all required evaluations and analyses), and the NRC staff has approved the licensee's modified FPP, which reflects the decision to comply with NFPA 805, as required by 10 CFR 50.48(a); and

Table 3.9-2

NFPA 805 Case #	Model	k-factor BTU/sec-°F	RHRSW Initiation Time (hrs)	Peak Pool Temperature (°F)	Minimum NPSHa (ft)	NPSHr (ft)	Margin NPSHa-NPSHr (ft)
1	SHEX	270	2.0	202.0	18.9	16	2.9
2	SHEX	270	2.0	195.3	22.6	16	6.6
3	SHEX	270	2.0	205.7	16.65	16	0.65
3	SHEX	289	1.5	199.1	20.67	16	4.67

While reviewing the values of the input parameters for the three NFPA cases, the NRC staff noted inconsistencies between those listed in LAR Attachment X and those in Enclosure 1 of a letter from TVA dated April 10, 2009 (Reference 138). In SCVB-RAI-8 (Reference 32), the NRC staff requested that the licensee justify or remove the inconsistencies within the three NFPA 805 cases analyzed as listed in Table 3.9-3 below.

Table 3.9-3

Parameter	Cases 1 & 3	Case 2	Reference 138, Enclosure 1
Initial suppression pool volume corresponding to minimum suppression pool level	122,940 ft^3	122,940 ft^3	121,500 ft^3 (page E1-6, item 3.a.1)
Initial wetwell airspace volume	127,860 ft^3	127,860 ft^3	129,300 ft^3 (page E1-7, item 3.c.2)
Initial drywell pressure	15.5 psia	17 psia	17 psia (page E1-5, item 2.b.6)
Initial drywell relative humidity	50%	20%	20% (page E1-5, item 2.d.5)
Initial wetwell pressure	14.4 psia	15.9 psia	15.9 psia (page E1-7, item 3.d.6)

In SCVB-RAI-9 (Reference 32), the NRC staff requested that the licensee explain why the following input parameters for the cases analyzed are conservative for minimizing NPSHa for the RHR pumps: (a) initial suppression pool volume corresponding to minimum suppression pool level, (b) initial drywell pressure, (c) initial drywell temperature, (d) initial drywell relative humidity, (e) initial wetwell pressure, (f) initial wetwell temperature, and (g) initial wetwell relative humidity.

In its response to SCVB-RAI-8 (Reference 17), the licensee stated that its letter dated April 10, 2009 (Reference 138), transmitted the parameter values for the design basis LOCA containment analysis for the extended power uprate (EPU). The special events analyses such

Temperature Sensitive Equipment Hot Gas Layer Study CFAST Zone Model Version 6	The licensee used CFAST (Version 6) to calculate the upper and lower gas layer temperatures for various compartments, and the layer height, for use in assessment of damage to temperature sensitive equipment.	NUREG-1824, Volume 5, 2007 (Reference 59) NIST SP 1086, 2008 (Reference 128)	• The modeling technique is validated in NUREG-1824 and an authoritative publication of NIST. • The licensee stated that in most cases, it applied the correlation within the validated range reported in NUREG-1824. The licensee provided justification for cases where it used the correlation outside the validated range reported in NUREG-1824 (Response to FM RAI 04 (Reference 14)). Based on its review and the information provided by the licensee, the NRC staff concludes that the use of CFAST model in the Browns Ferry application is acceptable.
Correlation for Heat Release Rates of Cables (Method of Lee)	The licensee used the Method of Lee to correlate bench scale data to HRRs from cable tray fires.	SFPE Handbook of Fire Protection Engineering, 4th Edition, Chapter 3-1, 2008 (Reference 131) NBSIR 85-3195, 1985 (Reference 132)	• The modeling technique is documented in the SFPE Handbook of Fire Protection Engineering and an authoritative publication of NIST. • The licensee stated that the correlation has been applied to cable tray arrangements, cable packing densities, and exposure fires consistent with those reported in NBISR 85-3195, or the model has been qualitatively justified as acceptable (Reference 8). Based on its review and the licensee's explanation, the NRC staff concludes that the use of this correlation in the Browns Ferry application is acceptable.

A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA AHon for/

Farideh E. Saba, 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

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