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

November 24, 2015

Mr. Eric A. Larson, Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO ADOPT NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805 (CAC NOS. MF3301 AND MF3302)

Dear Mr. Larson:

By letter dated December 23, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14002A086), as supplemented by letters dated February 14, 2014 (ADAMS Accession No. ML14051A499); April 27, 2015 (ADAMS Accession No. ML15118A484); May 27, 2015 (ADAMS Accession No. ML15147A372); June 26, 2015 (ADAMS Accession No. ML15177A110); and November 6, 2015 (ADAMS Accession No. ML15313A306), FirstEnergy Nuclear Operating Company submitted a license amendment request to change the Beaver Valley Power Station, Unit Nos. 1 and 2, fire protection program to one based on the National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, as incorporated into Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.48(c). To complete its review, the U.S. Nuclear Regulatory Commission staff requests a response to the enclosed request for additional information questions.

The draft questions were sent to Mr. Phil Lashley of your staff to ensure that the questions were understandable, the regulatory basis for the questions was clear, and to determine if the information was previously docketed. Please respond to the enclosed questions within 30 days from the date of this letter.

If you have any questions regarding this matter, please contact me at (301) 415-7128 or Taylor.Lamb@nrc.gov.

Sincerely,

Taylor A. Lamb, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
Request for Additional Information

cc w/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST TO ADOPT

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805,

"PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION

FOR LIGHT WATER REACTOR ELECTRIC GENERATING PLANTS,"

FIRSTENERGY NUCLEAR OPERATING COMPANY

BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-334 AND 50-412

By letter dated December 23, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14002A086), as supplemented by letters dated February 14, 2014 (ADAMS Accession No. ML14051A499); April 27, 2015 (ADAMS Accession No. ML15118A484); May 27, 2015 (ADAMS Accession No. ML15147A372); June 26, 2015 (ADAMS Accession No. ML15177A110); and November 6, 2015 (ADAMS Accession No. ML15313A306), FirstEnergy Nuclear Operating Company (the licensee) submitted a license amendment request (LAR) to change the Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS-1 and BVPS-2) fire protection program to one based on the National Fire Protection Association Standard (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, as incorporated into Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.48(c). To complete its review, the U.S. Nuclear Regulatory Commission (NRC) staff requests a response to the request for additional information (RAI) questions below.

**Fire Protection Engineering (FPE) RAI 04.01**

In its response to FPE RAI 04(a) in letter dated June 26, 2015, the licensee stated that an engineering evaluation analyzed compliance with NFPA 805, Section 3.3.5.3, for the low population of cables with potentially non-qualified electrical cable insulation material installed in electrical raceways at BVPS-1 and BVPS-2 and determined the configuration to be acceptable. The licensee also stated that it will include the engineering evaluation as a reference and remove the "Submit for NRC Approval" compliance statement for this NFPA 805, Chapter 3, requirement. NFPA 805, Section 3.3.5.3, requires that electric cable construction comply with a flame propagation test as acceptable to the authority having jurisdiction (AHJ), and the guidance in NFPA 805 Frequently Asked Question (FAQ) 06-0022, "Electrical Cable Flame Propagation Tests," identifies the flame propagation tests that are acceptable to the AHJ (i.e., the NRC). In accordance with FAQ 06-0008, "Alternative Method for Fire Protection Engineering Analyses," Revision 9, and the limitations imposed in the NRC closure memorandum, dated March 12, 2009 (ADAMS Accession No. ML073380976), existing engineering equivalency evaluations (EEEEs) can only be self-approved by the licensee if the following conditions apply:

(1) The fire protection system or feature meets "Functional Equivalency" with the NFPA 805, Chapter 3, requirement; or

(2) The fire protection system or feature required by NFPA 805, Chapter 4, is determined to be "Adequate for the Hazard" (e.g., Fire Alarm and Detection Systems (Section 3.8), Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9), Gaseous Fire Suppression Systems (Section 3.10), and Passive Fire Protection Features (Section 3.11)).

In the engineering evaluation, the licensee concluded that the low population of cables that do not meet Institute of Electrical and Electronics Engineers (IEEE) Standard 383, 1974 Edition, or equivalent, were considered in the fire modeling evaluation and determined to be adequate for the hazard. In accordance with FAQ 06-0008, this type of EEEE cannot be self-approved by the licensee. If performance-based engineering analysis of the non-qualified electrical cable insulation materials is credited in the compliance with NFPA 805, Section 3.3.5.3, then submit a request for NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii), and discuss how the configuration satisfies the nuclear safety and radiological release performance goals, performance objectives and performance criteria, maintains safety margins, and maintains fire protection defense-in-depth. If functional equivalency is credited in the compliance with NFPA 805, Section 3.3.5.3, then provide justification of the equivalency to this requirement.

**FPE RAI 05.01**

In letter dated June 26, 2015, the licensee stated in its response to FPE RAI 05(a) that it is changing its compliance statement in LAR Attachment A from "Complies with Clarification" to "Complies with the use of EEEE" for certain NFPA 805, Chapter 3, requirements. In accordance with FAQ 06-0008, and the limitations imposed in the NRC closure memorandum for FAQ 06-0008, EEEEs can only be self-approved by the licensee if the following conditions apply:

(1) The fire protection system or feature meets "Functional Equivalency" with the NFPA 805, Chapter 3, requirement; or

(2) The fire protection system or feature required by NFPA 805, Chapter 4, is determined to be "Adequate for the Hazard" (e.g., Fire Alarm and Detection Systems (Section 3.8), Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9), Gaseous Fire Suppression Systems (Section 3.10), and Passive Fire Protection Features (Section 3.11)).

The NRC reviewed the EEEEs in the licensee's NFPA 805 LAR supporting documents that evaluated the following configurations. Additional information is requested to support the bases for changing the compliance statement to "Complies with the Use of EEEE" for the NFPA 805, Chapter 3, requirement:

(a) In its response to FPE RAI 05(a)(i), the licensee stated that for the BVPS-2 outdoor hydrogen storage tank orientation, an EEEE was performed for compliance with NFPA 55, "Compressed Gases and Cryogenic Fluids Code," which concluded that the orientation of the tanks is acceptable to meet compliance with NFPA 805, Section 3.3.7.2. The separation distances in NFPA 55 are associated with protection from radiant heat based on the storage volume, and the requirement in NFPA 805, Section 3.3.7.2, is associated with

potential missile generation. Therefore, NFPA 55 is not applicable to this NFPA 805, Chapter 3, requirement, which goes beyond the requirements of NFPA 55. The EEEE for the NFPA 55 code evaluation determined that the configuration is adequate for the hazard. In accordance with FAQ 06-0008, this type of EEEE will need to be reviewed and approved by the NRC staff because "Adequate for the Hazard" EEEEs are associated with analyses performed under NFPA 805, Chapter 4, and this section provides requirements for fundamental fire protection program and design elements that require prior staff approval prior to making changes. Unless the design and installation of the hydrogen storage tanks is demonstrated by an EEEE to be functionally equivalent to the missile protection intended by the NFPA 805 requirement, provide the performance-based engineering analysis to obtain NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii). Discuss how the configuration satisfies the nuclear safety and radiological release performance goals, performance objectives and performance criteria, maintains safety margins, and maintains fire protection defense-in-depth.

(b) In its response to FPE RAI 05(a)(iii), the licensee stated that the existing fire pump installations and control circuits were evaluated for compliance with NFPA 20, 1970 Edition, "Centrifugal Fire Pumps," in an EEEE, which concluded that the configuration of the BVPS fire pumps installation and separation of control circuits is acceptable. The EEEE does not demonstrate "Functional Equivalency" with the requirements of NFPA 805, Section 3.5.5, but instead, it concludes that the configuration is "Adequate for the Hazard." In accordance with FAQ 06-0008, this type of EEEE will need to be reviewed and approved by the NRC staff because "Adequate for the Hazard" EEEEs are associated with analyses performed under NFPA 805, Chapter 4, and this section provides requirements for fundamental fire protection program and design elements that require prior staff approval prior to making changes. Since the design and installation of the fire pumps is not demonstrated by the EEEE to be functionally equivalent to the NFPA 805 requirement, provide the performance-based engineering analysis to obtain NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii). Discuss how the configuration satisfies the nuclear safety and radiological release performance goals, performance objectives and performance criteria, maintains safety margins, and maintains fire protection defense-in-depth.

(c) In its response to FPE RAI 05(a)(iv), the licensee stated that it will include the results of the applicable fire hydrant evaluation in LAR Attachment A. The EEEE for the NFPA 24 code evaluation involved the acceptability of the distance between Yard Fire Hydrant 9 and the Intake Structure as being functionally equivalent to the requirements of NFPA 805, Section 3.5.15, since adequate flow and pressure will be provided for the hydrant if no more than 100 feet of 1½ inches diameter hose is used, and all additional hose used is 2½ inches or larger in diameter. However, the licensee stated in LAR Attachment A that it "Complies with Clarification" because the distance from Yard Fire Hydrant 10 to the Intake Structure exceeds the allowable distance and is approximately 350 feet away. Discuss how the EEEE, which evaluates the distance between

Yard Fire Hydrant 9 and the Intake Structure, is credited as the basis for changing the compliance statement to "Complies with the Use of EEEE" in LAR Attachment A, which describes the distance between Yard Fire Hydrant 10 and the Intake Structure. In your discussion, address the discrepancy with the hydrant numbers (is it Hydrant 9 or Hydrant 10?).

(d) In its response to FPE RAI 05(a)(v), the licensee stated that an EEEE of the BVPS-1 and BVPS-2 interior standpipe and hose station systems determined that they are equivalent to the requirements of NFPA 14, "Standard for the Installation of Standpipe and Hose Systems." In LAR Attachment A, the licensee stated in the compliance basis for NFPA 805, Section 3.6.2, that pressure reducers are not provided at the hose stations, even though available pressure can exceed 100 pounds per square inch (psi) at some hose stations, and that the fire brigade members are trained and drilled using the expected pressures available at BVPS, and thus, the existing installation is considered adequate. Unless the EEEE that was performed for the NFPA 14 code evaluation demonstrates that the standpipe and hose station design is "Functionally Equivalent" to the requirements of NFPA 805, Section 3.6.2, provide the performance-based engineering analysis to obtain NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii), and discuss how the configuration satisfies the nuclear safety and radiological release performance goals, performance objectives, and performance criteria, maintains safety margins, and maintains fire protection defense-in-depth.

**FPE RAI 05.02**

In its response to FPE RAI 05(b) in letter dated June 26, 2015, the licensee stated that the compliance bases for each record identified in Table 5b, "BVPS-1 and BVPS-2 Revised Records From LAR Attachment A, Table B-1," will be revised to "Complies" and/or "Complies with Use of EEEE" for various NFPA 805, Chapter 3, elements. The guidance provided in FAQ 07-0036, "Incorporation of Pilot Plant Lessons Learned - Table B-1," states that the compliance statement to NFPA 805, Chapter 3, should be documented. In addition, FAQ 07-0033, "Transition of Existing Engineering Equivalency Evaluations" Revision 1, and FAQ 06-0008 provide guidance on when the use of an EEEE can be credited to satisfy the NFPA 805, Chapter 3, requirement without prior NRC approval. As described in FAQ 06-0008, and the limitations imposed in the NRC closure memorandum for FAQ 06-0008, EEEEs can only be self-approved by the licensee if the following conditions apply:

(1) The fire protection system or feature meets "Functional Equivalency" with the NFPA 805, Chapter 3, requirement; or

(2) The fire protection system or feature required by NFPA 805, Chapter 4, is determined to be "Adequate for the Hazard" (e.g., Fire Alarm and Detection Systems (Section 3.8), Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9), Gaseous Fire Suppression Systems (Section 3.10), and Passive Fire Protection Features (Section 3.11)).

Therefore, EEEEs that involve a bounding approach or are determined to be "adequate for the hazard" for fire protection systems and features that are not required by NFPA 805 Chapter 4 will require prior NRC staff approval, and the licensee may use the latitude provided in 10 CFR 50.48(c)(2)(vii) to obtain NRC staff approval of these types of EEEEs. The following information is requested to support the NRC staff's review of the licensee's response to FPE RAI 05(b):

(a) For each fire protection system and feature identified in Table 5b (except for the Carbon Dioxide ($CO_2$) system installed in Fire Compartment 2-SB-3 to meet the requirements of NFPA 805, Section 3.10.1), clearly identify if the NFPA 805, Chapter 3, compliance statement is either "Complies" or "Complies with Use of EEEE," and provide the compliance bases that will be credited to replace "Complies with Clarification" in LAR Attachment A. If the compliance statement involves "Complies with the Use of EEEE," then provide a summary of the fire protection feature or system that is evaluated in the EEEE, the bases for concluding whether the EEEE meets functional equivalency of the NFPA 805, Chapter 3; requirement or is adequate for the hazard, and the reference source.

(b) For the $CO_2$ system installed in Fire Compartment 2-SB-3, the licensee stated in LAR Attachment A that the testing frequency for the $CO_2$ system is every 18 months based on the performance of the system, and that the Electric Power Research Institute (EPRI) Technical Report (TR)-1006756, "Fire Protection Equipment Surveillance Optimization and Maintenance Guide for Fire Protection Systems and Features," suggests the use of this frequency as the basis for "Complies with Clarification." In its response to FPE RAI 05(b), the licensee stated that the compliance statement will change to "Complies" and/or "Complies with the Use of EEEE." The use of a performance-based method (i.e., EPRI TR-1006756) to determine acceptability of a testing frequency does not meet the criteria for "Complies" or "Complies with the Use of EEEE" and will require prior NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii). Provide the performance-based engineering analysis that evaluates the acceptability of the testing frequency for the $CO_2$ system in Fire Compartment 2-SB-3 for compliance with NFPA 805, Section 3.10.1, including the specific EPRI TR-1006756 reference, and obtain NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii). Discuss how the configuration satisfies the nuclear safety and radiological release performance goals, performance objectives and performance criteria, maintains safety margins, and maintains fire protection defense-in-depth.

**FPE RAI 06.01**

In its response to FPE RAI 06 in letter dated April 27, 2015, the licensee stated that the compliance statement for NFPA 805, Section 3.3.3, is changed from "Complies with Clarification" to "Complies by Previous NRC Approval" and provided the appropriate excerpts from its licensing bases documents that demonstrate that the interior finishes for both BVPS-1 and BVPS-2 have a flame spread rating of less than 25 per American Society for Testing and Materials Standard E-84 test method or equivalent. The licensee further stated that the requirements of NFPA 805, Section 3.3.3., with respect to compliance with NFPA 101, "Life

Safety Code," will be incorporated into the appropriate procurement and plant documents as an implementation item in LAR Attachment S. However, in its response to FPE RAI 05(b) in letter dated June 26, 2015, the licensee stated that the compliance statement for NFPA 805, Section 3.3.3, will be changed from "Complies with Clarification" to "Complies" and/or "Complies with Use of EEEE," and did not provide information as to whether its response to FPE RAI 05(b) will supersede its earlier response to FPE RAI 06 with respect to compliance with NFPA 805, Section 3.3.3.

Clarify how BVPS-1 and BVPS-2 will comply with NFPA 805, Section 3.3.3. If an implementation item will be required to meet its compliance bases, then provide the implementation item number and a clear description of the implementation item. If the licensee determines that it "Complies with Use of EEEE," then in accordance with the guidance in FAQ 07-0036 and FAQ 06-0008, provide a summary of the fire protection feature or system that is evaluated in the EEEE, the bases for concluding whether the EEEE meets functional equivalency of the NFPA 805, Chapter 3, requirement, and the reference source.

**FPE RAI 12.01**

In its response to FPE RAI 12 and FPE RAI 14(a) in letter dated June 26, 2015, the licensee stated that Approval Request 1 in LAR Attachment L will be withdrawn, and that the compliance statement for the requirements of NFPA 805, Section 3.3.5.1, will be changed to "Complies with Use of an EEEE" in LAR Attachment A. The licensee stated that an EEEE was performed and determined that cables that are not in conformance with NFPA 805, Section 3.3.5.1, above suspended ceilings do not adversely affect the nuclear safety capability; do not impact the radiological release performance goals and performance objectives and performance criteria of NFPA 805, Section 1.5; and maintain the safety margins and fire protection defense-in-depth. This NFPA 805, Chapter 3, requirement is not associated with NFPA code compliance or a fire protection system or feature necessary to meet NFPA 805, Chapter 4, deterministic requirements. Therefore, the guidance in FAQ 06-0008, Revision 9, and limitations described in the NRC closure memo for FAQ 06-0008, states that this type of EEEE would require prior NRC approval.

Describe how BVPS-1 and BVPS-2 will comply with NFPA 805, Section 3.3.5.1. If the licensee decides to re-submit LAR Attachment L, Approval Request 1, or a new engineering evaluation to obtain NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii), then provide the information requested in FPE RAI 12 and FPE RAI 14(a), which was provided in the NRC letter dated March 4, 2015 (ADAMS Accession No. ML15049A507).

If you have any questions regarding this matter, please contact me at (301) 415-7128 or Taylor.Lamb@nrc.gov.

Sincerely,

***/RA/***

Taylor A. Lamb, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
Request for Additional Information

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