



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

July 30, 2019

Ms. Cheryl A. Gayheart  
Regulatory Affairs Director  
Southern Nuclear Operating Company, Inc.  
3535 Colonnade Parkway  
Birmingham, AL 35243

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2 – ISSUANCE OF  
AMENDMENT NOS. 224 AND 221, RE: PERFORMANCE-BASED FIRE  
PROTECTION ALTERNATIVE FOR THERMAL INSULATION MATERIAL  
(EPID L-2018-LLA-0566)

Dear Ms. Gayheart:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 224 to Renewed Facility Operating License No. NPF-2 and Amendment No. 221 to Renewed Facility Operating License No. NPF-8 for the Joseph M. Farley Nuclear Plant, Units 1 and 2, respectively. The amendments are in response to your application dated December 14, 2018.

The amendments revise the plant operating licenses to allow, as a performance-based method, use of thermal insulation materials in limited applications subject to appropriate engineering reviews and controls, as a deviation from National Fire Protection Association (NFPA) 805 Chapter 3, Section 3.3, "Prevention".

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

Sincerely,

A handwritten signature in cursive script that reads "Shawn Williams".

Shawn A. Williams, Senior Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-348 and 50-364

Enclosures:

1. Amendment No. 224 to NPF-2
2. Amendment No. 221 to NPF-8
3. Safety Evaluation

cc: Listserv



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

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

ALABAMA POWER COMPANY

DOCKET NO. 50-348

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 224  
Renewed License No. NPF-2

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Joseph M. Farley Nuclear Plant, Unit 1, (the facility), Renewed Facility Operating License No. NPF-2, filed by Southern Nuclear Operating Company, Inc. (the licensee), dated December 14, 2018, 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 license 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, paragraph 2.C.(4) the Renewed Facility Operating License No. NPF-2 is hereby amended to read as follows:

2.C.(4)        Fire Protection

Southern Nuclear Operating Company shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated September 25, 2012; April 25, 2016; December 14, 2018; and supplements dated December 20, 2012; September 16, 2013; October 30, 2013; November 12, 2013; April 23, 2014; May 23, 2014; July 3, 2014; August 11, 2014; August 29, 2014; October 13, 2014; January 16, 2015, and August 11, 2017, as approved in the safety evaluation reports dated March 10, 2015, October 17, 2016, November 1, 2017, and July 30, 2019. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Michael T. Markley, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility  
Operating License

Date of Issuance: July 30, 2019



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

SOUTHERN NUCLEAR OPERATING COMPANY

ALABAMA POWER COMPANY

DOCKET NO. 50-364

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 221  
Renewed License No. NPF-8

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment to the Joseph M. Farley Nuclear Plant, Unit 2, (the facility), Renewed Facility Operating License No. NPF-8, filed by Southern Nuclear Operating Company, Inc. (the licensee), dated December 14, 2018, 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 license 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, paragraph 2.C.(6) the Renewed Facility Operating License No. NPF-8 is hereby amended to read as follows:

2.C.(6)        Fire Protection

Southern Nuclear Operating Company shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated September 25, 2012; April 25, 2016; December 14, 2018; and supplements dated December 20, 2012; September 16, 2013; October 30, 2013; November 12, 2013; April 23, 2014; May 23, 2014; July 3, 2014; August 11, 2014; August 29, 2014; October 13, 2014; January 16, 2015, and August 11, 2017, as approved in the safety evaluation reports dated March 10, 2015, October 17, 2016, November 1, 2017, and July 30, 2019. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



FOR

Michael T. Markley, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility  
Operating License

Date of Issuance: July 30, 2019

ATTACHMENT TO JOSEPH M. FARLEY NUCLEAR PLANTS

UNITS 1 AND 2

LICENSE AMENDMENT NO. 224

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-2

DOCKET NO. 50-348

AND LICENSE AMENDMENT NO. 221

TO RENEWED FACILITY OPERATING LICENSE NO. NPF-8

DOCKET NO. 50-364

Replace the following pages of the Renewed Facility Operating Licenses with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

License

NPF-2, page 5

NPF-8, page 4

Insert

License

NPF-2, page 5

NPF-8, page 4

6) A procedure identifying the authority responsible for the interpretation of the data and the sequence and timing of administrative events required to initiate corrective action.

h. The Additional Conditions contained in Appendix C, as revised through Amendment No. 146, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the additional conditions.

i. Deleted per Amendment 152

(4) Fire Protection

Southern Nuclear Operating Company shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated September 25, 2012; April 25, 2016; December 14, 2018; and supplements dated December 20, 2012; September 16, 2013; October 30, 2013; November 12, 2013; April 23, 2014; May 23, 2014; July 3, 2014; August 11, 2014; August 29, 2014; October 13, 2014; January 16, 2015, and August 11, 2017, as approved in the safety evaluation reports dated March 10, 2015, October 17, 2016, November 1, 2017, and July 30, 2019. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

a. Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at Farley. Acceptable methods to assess the risk of the change may include methods that have been used in the peer-reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

(6) Fire Protection

Southern Nuclear Operating Company shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated September 25, 2012; April 25, 2016; December 14, 2018; and supplements dated December 20, 2012; September 16, 2013; October 30, 2013; November 12, 2013; April 23, 2014; May 23, 2014; July 3, 2014; August 11, 2014; August 29, 2014; October 13, 2014; January 16, 2015, and August 11, 2017, as approved in the safety evaluation reports dated March 10, 2015, October 17, 2016, November 1, 2017, and July 30, 2019. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

(a) Risk-Informed Changes that May Be Made Without Prior NRC Approval

A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at Farley. Acceptable methods to assess the risk of the change may include methods that have been used in the peer-reviewed fire PRA model, methods that have been approved by NRC through a plant-specific license amendment or NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

1. Prior NRC review and approval is not required for changes that clearly result in a decrease in risk. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.
2. Prior NRC review and approval is not required for individual changes that result in a risk increase less than  $1 \times 10^{-7}$ /year (yr) for CDF and less than  $1 \times 10^{-8}$ /yr for LERF. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.





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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 224 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-2

AND

AMENDMENT NO. 221 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-8

SOUTHERN NUCLEAR OPERATING COMPANY

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

By letter dated December 14, 2018, (Reference 1), Southern Nuclear Operating Company, (SNC, the licensee) submitted a license amendment request (LAR) regarding the Joseph M. Farley Nuclear Plant, Units Nos. 1 and 2 (Farley), requesting a change to Farley's approved fire protection program (FPP). The amendments revise license conditions in the Farley's Renewed Facility Operating Licenses (RFOLs) associated with Farley's FPP, which is authorized under Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.48(c), "National Fire Protection Association (NFPA) Standard 805." Specifically, the licensee requested approval for the use of a performance-based (PB) method to demonstrate an equivalent level of fire protection for the requirements of NFPA Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," (Reference 2), Section 3.3.4, "Insulation Materials."

2.0 REGULATORY EVALUATION

2.1 Licensee's Proposed Changes

In its LAR dated December 14, 2018, the licensee proposed to modify its FPP to allow the use of a PB method to demonstrate an equivalent level of fire protection for the requirements of NFPA 805, Section 3.3.4, "Insulation Materials," in order to retain certain currently-installed thermal insulation materials, and to allow the future use of these insulation materials in limited applications subject to appropriate engineering reviews and controls. The licensee submitted its request to use a PB method in accordance with the requirements of 10 CFR 50.48(c)(2)(vii).

The licensee also proposed the following changes to its fire protection license conditions for RFOL Nos. NPF-2 and NPF-8, Condition 2.C.(4) and Condition 2.C.(6) (changes shown in bold):

Farley Unit 1 License Condition 2.C.(4):

(4) Fire Protection

Southern Nuclear Operating Company shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated September 25, 2012; April 25, 2016; **December 14, 2018**; and supplements dated December 20, 2012; September 16, 2013; October 30, 2013; November 12, 2013; April 23, 2014; May 23, 2014; July 3, 2014; August 11, 2014; August 29, 2014; October 13, 2014; January 16, 2015, and August 11, 2017, as approved in the safety evaluation reports dated March 10, 2015, October 17, 2016, November 1, 2017, and **[INSERT DATE]**. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

Farley Unit 2 License Condition 2.C.(6):

(6) Fire Protection

Southern Nuclear Operating Company shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the licensee amendment requests dated September 25, 2012; April 25, 2016; **December 14, 2018**; and supplements dated December 20, 2012; September 16, 2013; October 30, 2013; November 12, 2013; April 23, 2014; May 23, 2014; July 3, 2014; August 11, 2014; August 29, 2014; October 13, 2014; January 16, 2015, and August 11, 2017, as approved in the safety evaluation reports dated March 10, 2015, October 17, 2016, November 1, 2017, and **[INSERT DATE]**. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c), and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.

2.2 Regulatory Requirements

The following regulations address fire protection:

Section 50.48, "Fire Protection," of 10 CFR, provides the NRC requirements for nuclear power plant fire protection. The NRC regulations include specific requirements for requesting approval for a risk-informed and performance-based (RI/PB) FPP based on the provisions of NFPA 805.

Section 50.48(a)(1) of 10 CFR requires that each holder of an operating license have a FPP that satisfies General Design Criterion (GDC) 3, "Fire Protection," of Appendix A to 10 CFR part 50, "General Design Criteria for Nuclear Power Plants."

Section 50.48(c) of 10 CFR incorporates NFPA 805 (2001 Edition) by reference, with certain exceptions, modifications, and supplementation. This regulation establishes the requirements for using an RI/PB FPP in conformance with NFPA 805 as an alternative to the requirements associated with 10 CFR 50.48(b) and Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to 10 CFR part 50, or the specific plant fire protection license condition. The regulation also includes specific requirements for requesting approval for an RI/PB FPP based on the provisions of NFPA 805.

Paragraph 50.48(c)(3)(i) of 10 CFR states, that:

A licensee may maintain a fire protection program that complies with NFPA 805 as an alternative to complying with paragraph b [10 CFR 50.48(b)] of this section for plants licensed to operate before January 1, 1979, or the fire protection license conditions for plants licensed to operate after January 1, 1979. The licensee shall submit a request to comply with NFPA 805 in the form of an application for license amendment under §50.90. The application must identify any orders and license conditions that must be revised or superseded and contain any necessary revisions to the plant's technical specifications and the bases thereof. The Director of the Office of Nuclear Reactor Regulation, or a designee of the Director, may approve the application if the Director or designee determines that the licensee has identified orders, license conditions, and the technical specifications that must be revised or superseded, and that any necessary revisions are adequate. Any approval by the Director or the designee must be in the form of a license amendment approving the use of NFPA 805 together with any necessary revisions to the technical specifications.

Section 50.48(c)(3)(ii) of 10 CFR states that:

The licensee shall complete its implementation of the methodology in Chapter 2 of NFPA 805 (including all required evaluations and analyses) and, upon completion, modify the fire protection plan required by paragraph (a) of this section to reflect the licensee's decision to comply with NFPA 805, before changing its fire protection program or nuclear power plant as permitted by NFPA 805.

The purpose of 10 CFR 50.48(c)(3)(ii) is explained in the statement of considerations for the Final Rule, "Voluntary Fire Protection Requirements for Light Water Reactors; Adoption of NFPA 805 as a Risk-Informed, Performance-Based Alternative" (69 FR 33536; June 16, 2004), which states, in part, that:

This paragraph requires licensees to complete all of the Chapter 2 methodology (including evaluations and analyses) and to modify their fire protection plan before making changes to the fire protection program or to the plant configuration. This process ensures that the transition to an NFPA 805 configuration is conducted in a complete, controlled, integrated, and organized manner. This requirement also precludes licensees from implementing NFPA 805 on a partial or selective basis (e.g., in some fire areas and not others, or truncating the methodology within a given fire area).

Appendix A to 10 CFR Part 50, GDC 3, states that:

Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and control room. Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety. Firefighting systems are designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.

The regulations also allow for flexibility that was not included in the NFPA 805 standard. Licensees who choose to adopt 10 CFR 50.48(c) but wish to use the PB methods permitted elsewhere in the standard to meet the fire protection requirements of NFPA 805, Chapter 3, "Fundamental Fire Protection Program and Design Elements," may do so by submitting a LAR in accordance with 10 CFR 50.48(c)(2)(vii). This regulation further states that:

The Director of the Office of Nuclear Reactor Regulation, or a designee of the Director, may approve the application if the Director or designee determines that the performance-based approach;

- (A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
- (B) Maintains safety margins; and
- (C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

Alternatively, licensees may choose to use risk informed (RI) or PB alternatives to comply with NFPA 805 by submitting a LAR in accordance with 10 CFR 50.48(c)(4), which states, in part, that:

The Director of the Office of Nuclear Reactor Regulation, or designee of the Director, may approve the application if the Director or designee determines that the proposed alternatives:

- (i) Satisfy the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
- (ii) Maintain safety margins; and
- (iii) Maintain fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

In addition to the conditions outlined by the rule that require licensees to submit a LAR for NRC review and approval in order to adopt an RI/PB FPP, a licensee may submit additional elements

of its FPP for which it wishes to receive specific NRC review and approval, as set forth in Regulatory Position C.2.2.1 of Regulatory Guide (RG) 1.205, Revision 1, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants" (Reference 3). Inclusion of these elements in the NFPA 805 LAR is meant to alleviate uncertainty in portions of the current FPP licensing bases as a result of the lack of specific NRC approval of these elements. Regulatory guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions that differ from those set forth in regulatory guides will be deemed acceptable if those methods provide an adequate basis for the findings required for the issuance or continuance of a permit or license by the Commission. Accordingly, any submittal addressing these additional FPP elements needs to include sufficient detail to allow the NRC staff to assess whether the licensee's treatment of these elements meets the 10 CFR 50.48(c) requirements.

Pursuant to 10 CFR 50.90, whenever a holder of a license desires to amend the license or permit, an application for an amendment must be filed with the Commission describing the changes desired, and following, as far as applicable, the form prescribed for original applications. Accordingly, a licensee who seeks to amend its NFPA 805 authorizations must file an amendment stating, as applicable, the desired changes to orders, license conditions, and technical specifications.

Pursuant to 10 CFR 50.92(a), in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations, that govern the issuance of initial licenses to the extent applicable and appropriate. Under 10 CFR 50.40, common standards for issuance of licenses include considerations of safety and satisfaction of the requirements of the National Environmental Policy Act of 1969 as implemented in 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." Under 10 CFR 50.57(a), to issue an operating license, the Commission must find, among other things, that (1) there is reasonable assurance that the activities authorized by the operating license can be conducted without endangering the health and safety of the public; (2) there is reasonable assurance that such activities will be conducted in compliance with the regulations in this chapter; and (3) the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public. Additional findings required to issue amendments related to fire protection are provided in 10 CFR 50.48, as discussed below.

In addition, 10 CFR 50.32, "Elimination of Repetition," states, in part, that "the applicant may incorporate by reference information contained in previous applications, statements or reports filed with the Commission: *Provided*, That such references are clear and specific."

### 2.3 Applicable Codes, Standards, and Regulatory Guides

The 2001 edition of NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," (Reference 2), specifies the minimum fire protection requirements for existing light water nuclear power plants (NPPs) during all phases of plant operations, including shutdown, degraded conditions, and decommissioning. NFPA 805 was developed to provide a comprehensive RI/PB standard for fire protection. The NFPA 805 Technical Committee on Nuclear Facilities is composed of nuclear plant licensees, the NRC, insurers, equipment manufacturers, and subject matter experts. The standard was developed in accordance with NFPA processes and consisted of a number of technical meetings and reviews of draft documents by committee and industry representatives. The scope of NFPA 805 includes goals related to nuclear safety, radioactive release, life safety, and plant

damage/business interruption. The standard addresses fire protection requirements for nuclear plants during all plant operating modes and conditions, including shutdown and decommissioning, which had not been explicitly addressed by previous requirements and guidelines. NFPA 805 became effective on February 9, 2001.

Revision 1 of RG 1.205, (Reference 3), provides guidance for use in complying with the requirements that the NRC has promulgated for RI/PB FPPs that comply with 10 CFR 50.48 and the referenced 2001 Edition of the NFPA standard. Revision 1 of RG 1.205 sets forth regulatory positions; clarifies the requirements of 10 CFR 50.48(c) and NFPA 805, clarifies the guidance in Nuclear Energy Institute (NEI) 04-02, Revision 2, "Guidance for Implementing a Risk-Informed, Performance-Based fire Protection Program Under 10 CFR 50.48(c)," April 2008 (Reference 4); and provides exceptions to the NEI 04-02 guidance where required. Should a conflict occur between NEI 04-02 and RG 1.205, the regulatory positions in RG 1.205 govern.

NEI 04-02 (Reference 4), provides guidance for implementing the requirements of 10 CFR 50.48(c), and represents methods for implementing in whole or in part a RI/PB FPP. This implementing guidance for NFPA 805 has two primary purposes: (1) provide direction and clarification for adopting NFPA 805 as an acceptable approach to fire protection, consistent with 10 CFR 50.48(c); and (2) provide additional supplemental technical guidance and methods for using NFPA 805 and its appendices to demonstrate compliance with fire protection requirements. Although there is a significant amount of detail in NFPA 805 and its appendices, clarification and additional guidance for select issues help ensure consistency and effective utilization of the standard. The NEI 04-02 guidance focuses attention on the RI/PB FPP fire protection goals, objectives, and performance criteria contained in NFPA 805 and the RI/PB tools considered acceptable for demonstrating compliance. Revision 2 of NEI 04-02 incorporates guidance from RG 1.205 and approved Frequently Asked Questions (FAQs).

### 3.0 TECHNICAL EVALUATION

#### 3.1 Background/Discussion

In its LAR, the licensee requested approval of a PB method to demonstrate an equivalent level of fire protection for the NFPA 805, Section 3.3.4 requirement that thermal insulation materials, radiation shielding materials, ventilation duct materials, and soundproofing materials be noncombustible or limited combustible. Specifically, the licensee stated that in several areas, exposed thermal insulation materials are installed on various heating, ventilation and air conditioning (HVAC) system piping to prevent sweating and that although these materials comply with the flame spreading rating of 25 or less, these materials do not meet the definition of "limited combustible" due to the heat value exceeding 3,500 British thermal units/pound (Btu/lb).

NFPA 805, Section 1.2, "Defense-in-Depth," (DID) states that:

Protecting the safety of the public, the environment, and plant personnel from a plant fire and its potential effect on safe reactor operations is paramount to this standard. The fire protection standard shall be based on the concept of defense-in-depth. Defense-in-depth shall be achieved when an adequate balance of each of the following elements is provided:

- (1) Preventing fires from starting;

- (2) Rapidly detecting fires and controlling and extinguishing promptly those fires that do occur, thereby limiting fire damage; and
- (3) Providing an adequate level of fire protection for structures, systems and components important to safety, so that a fire that is not promptly extinguished will not prevent essential plant safety functions from being performed.

NFPA 805, Section 1.3.1, "Nuclear Safety Goal," states that:

The nuclear safety goal is to provide reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition.

NFPA 805, Section 1.3.2, "Radioactive Release Goal," states that:

The radioactive release goal is to provide reasonable assurance that a fire will not result in a radiological release that adversely affects the public, plant personnel, or the environment.

NFPA 805, Section 1.4.1, "Nuclear Safety Objectives," states that:

In the event of a fire during any operational mode and plant configuration, the plant shall be as follows:

- (1) *Reactivity Control.* Capable of rapidly achieving and maintaining subcritical conditions.
- (2) *Fuel Cooling.* Capable of achieving and maintaining decay heat removal and inventory control functions.
- (3) *Fission Product Boundary.* Capable of preventing fuel clad damage so that the primary containment boundary is not challenged.

NFPA 805, Section 1.4.2, "Radioactive Release Objective," states that:

Either of the following objectives shall be met during all operational modes and plant configurations.

- (1) Containment integrity is capable of being maintained.
- (2) The source term is capable of being limited.

NFPA 805, Section 1.5.1, "Nuclear Safety Performance Criteria," states that:

Fire protection features shall be capable of providing reasonable assurance that, in the event of a fire, the plant is not placed in an unrecoverable condition. To demonstrate this, the following performance criteria shall be met:

- (a) *Reactivity Control.* Reactivity control shall be capable of inserting negative reactivity to achieve and maintain subcritical conditions.

Negative reactivity inserting shall occur rapidly enough such that fuel design limits are not exceeded.

- (b) *Inventory and Pressure Control.* With fuel in the reactor vessel, head on and tensioned, inventory and pressure control shall be capable of controlling coolant level such that sub-cooling is maintained for a PWR [pressurized-water reactor] and shall be capable of maintaining or rapidly restoring reactor water level above top of active fuel for a BWR [boiling-water reactor] such that fuel clad damage as a result of a fire is prevented.
- (c) *Decay Heat Removal.* Decay heat removal shall be capable of removing sufficient heat from the reactor core or spent fuel such that fuel is maintained in a safe and stable condition.
- (d) *Vital Auxiliaries.* Vital auxiliaries shall be capable of providing the necessary auxiliary support equipment and systems to assure that the systems required under (a), (b), (c), and (e) are capable of performing their required nuclear safety function.
- (e) *Process Monitoring.* Process monitoring shall be capable of providing the necessary indication to assure the criteria addressed in (a) through (d) have been achieved and are being maintained.

NFPA 805, Section 1.5.2, "Radioactive Release Performance Criteria," states that:

Radiation release to any unrestricted area due to the direct effects of fire suppression activities (but not involving fuel damage) shall be as low as reasonably achievable and shall not exceed applicable 10 CFR, Part 20, Limits.

Although not a part of the requirements of NFPA 805, and thus not required, NFPA 805, Appendix A, Section A.2.4.4.3, provides the following background related to the meaning of the term "safety margins":

An example of maintaining sufficient safety margins occurs when the existing calculated margin between the analysis and the performance criteria compensates for the uncertainties associated with the analysis and data. Another way that safety margins are maintained is through the application of codes and standards. Consensus codes and standards are typically designed to ensure such margins exist.

NEI 04-02, Section 5.3.5.3, "Safety Margins," lists two specific criteria that should be addressed when considering the impact of plant changes on safety margins:

- Codes and standards or their alternatives accepted for use by the NRC are met; and,
- Safety analysis acceptance criteria in the licensing basis (e.g., Final Safety Analysis Report (FSAR), supporting analyses, etc.) are met, or provides sufficient margin to account for analysis and data uncertainty.



As a supplement to the definition of DID provided in NFPA 805, Section 1.2, the NRC-endorsed guidance in NEI 04-02, Section 5.3.5.2, states that:

In general, the defense-in-depth requirement is satisfied if the proposed change does not result in a substantial imbalance in:

- Preventing fires from starting;
- Detecting fires quickly and extinguishing those that do occur, thereby limiting fire damage; and
- Providing adequate level of fire protection for structures, systems and components important to safety, so that a fire that is not promptly extinguished will not prevent essential plant safety functions [from] being performed.

NFPA 805, Section 3.3.4, "Insulation Material," states that:

Thermal insulation materials, radiation shielding materials, ventilation duct materials, and soundproofing materials shall be noncombustible or limited combustible.

NFPA 805, Section 1.6.36, "Limited Combustible," states that:

Material that, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg [kilojoule/kilogram]) and either has a structural base of noncombustible material with a surfacing not exceeding a thickness of 1/8 in. [inch] (3.2 mm [millimeter]) that has a flame spread rating not greater than 50, or has another material having neither a flame spread rating greater than 25 nor evidence of continued progressive combustion, even on surfaces exposed by cutting through the material on any plane.

NFPA 805, Section 1.6.41, "Noncombustible Material," states that:

A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

The licensee stated that a number of plant locations were identified where insulation material (polyisocyanurate/foam insulation) is used on miscellaneous or HVAC systems for maintaining efficiency of the system and/or preventing pipe sweat. The licensee further stated that the insulation material is also used for safety applications.

The licensee stated that the insulation materials meet the requirements for a flame spread rating of 25 or less, as measured using the ASTM International Standard E-84, "Standard Test for Surface Characteristics of Building Materials," (ASTM E-84) (Reference 5) test method, but do not meet the current heat value content requirement based on the definition of a limited combustible due to the heat value exceeding 3,500 Btu/lb.

The licensee stated that the basis for the approval request is that the forms (wrapped around pipes, ducts, or beams, etc.), in which the thermal insulation are installed and the conditions anticipated (limited applications, no new ignition sources introduced, design bases of installed fire protection systems not exceeded, etc.), meet the intent of the revised limited combustible material definition because the materials have a flame spread rating of 25 or less and will not support

continued progressive combustion. The licensee also stated that, specifically, the thermal insulation materials have flame spread and smoke developed ratings of 25 and 50 per ASTM E-84, respectively, and therefore, those insulation materials will not contribute significantly to a fire even though the thermal insulation materials (i.e., polyisocyanurate/foam insulation) exceed the NFPA 805 heat value of 3,500 BTU/lb.

The licensee further stated that the fire probabilistic risk assessment (FPRA) development requires the inclusion of the effect of intervening or secondary combustibles to be documented and included in the analysis where determined to have fire effects as part of the PB approach and that it has procedures in place that govern its engineering change process (ECP) to review future installation impacts to the FPP and FPRA, resulting in updates to the applicable analyses and calculations as required.

The licensee stated that the use of insulation material other than noncombustible and more than limited combustible has no impact on the radiological release performance criteria and that the radiological release review was performed based on the manual fire suppression activities in areas containing or potentially containing radioactive materials and is not dependent on the type of thermal insulation material. The licensee further stated that the insulation material, regardless of heat contribution value, does not change the radiological release evaluation performed which concluded that potentially contaminated water is contained and smoke is monitored. The licensee further stated that the insulation materials do not add additional radiological materials to the area or challenge systems boundaries.

The licensee stated that future installations of these insulation materials are controlled by the plant modifications and engineering change control process, which requires the performance of an NFPA 805 FPP change impact screening. The licensee further stated that the process includes a screening requirement for insulation material to be noncombustible or limited combustible material, and that insulation materials that do not meet this screening criteria require a fire protection program change evaluation.

The licensee stated that an evaluation of these materials has determined they do not contribute appreciably to the spread of fire, nor represent a secondary combustible beyond those currently analyzed in the FPRA due to the limited applications where these materials are installed. The licensee further stated that plant secondary combustibles, including insulating materials, are considered in the fire modeling input to the FPRA.

### 3.2 Safety Margins/Defense-in-Depth

The licensee stated that the limited installations of the insulation materials do not compromise post-fire safe shutdown capability as previously designed, reviewed and considered and that essential fire protection safety functions are maintained and are capable of being performed. The licensee further stated that because the insulation materials do not compromise post-fire safe shutdown capability as previously designed, reviewed and considered, it is concluded that this change does not involve a significant reduction in a margin of safety.

The licensee stated that the three echelons of DID are: (1) to prevent fires from starting (combustible/hot work controls), (2) to rapidly detect, control, and extinguish fires that do occur, thereby limiting damage (fire detection systems, automatic fire suppression, manual fire suppression, pre-fire plans), and (3) to provide an adequate level of fire protection for systems and structures so that a fire will not prevent essential safety functions from being performed (fire barriers, fire rated cable, success path remains free of fire damage, recovery actions).

The licensee stated that the use of an insulation material that exceeds the NFPA 805 definition (i.e., exceeds the NFPA 805 heat value of 3,500 BTU/lb) does not affect echelons 1, 2, and 3. The licensee stated that the insulation material (and specifically the increase in heat contribution in conjunction with the limited applications), does not introduce new ignition sources, does not exceed the design bases of installed fire protection systems, does not compromise manual fire suppression functions, and does not adversely impact fire protection systems and features or post-fire safe shutdown capability as previously designed, reviewed and considered.

In regard to echelon 1, the licensee stated that the thermal insulation does not introduce new ignition sources and presents a negligible hazard in terms of secondary or intervening combustibles. The licensee further stated that the selection and application of thermal insulation is controlled per the SNC design change process, which would result in updates to the applicable analyses and calculations as required.

In regard to echelon 2, the licensee stated that the limited applications of exposed thermal insulation materials installed for industrial personnel safety and on miscellaneous system piping do not result in increased combustible loading that would challenge the design bases of the installed fire protection systems. The licensee further stated that the presence of the thermal insulation and associated procedural controls do not impact the ability of the automatic suppression and detection systems to perform credited functions as the materials are limited in application and will not support continued progressive combustion. Finally, the licensee stated that portable fire extinguishers and hose stations are available for manual firefighting activities by the site fire brigade, and if a fire was to occur, damage would be limited.

In regard to echelon 3, the licensee stated that the applications of exposed thermal insulation materials installed for industrial personnel safety and on miscellaneous system piping do not adversely impact the installed fire protection systems and features, and essential safety functions are maintained and capable of being performed. The licensee stated that the insulation material does not compromise post-fire safe shutdown capability as previously designed, reviewed and considered. The licensee further stated that its procedures which govern the plant modifications and engineering change control process are in place to review future installation impacts to the FPP and FPRA, resulting in updates to the applicable analyses and calculations as required.

### 3.3 Staff Evaluation

The NRC staff reviewed the information provided by the licensee in its LAR, which included discussions of the impact of the proposed change on the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release, DID, and safety margins as required by 10 CFR 50.48(c)(2)(vii).

The NRC staff determined that the proposed change satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release because the insulation materials: (1) are installed in limited quantities throughout the plant only on certain pipes, HVAC ducts, or beams; (2) will not contribute significantly to fire because they do not support continued progressive combustion because the flame spread rating is 25 or less; (3) meet the intent of the revised limited combustible material definition because the materials have a flame spread rating of 25 or less which is half of the maximum value of 50 allowed by NFPA 805; (4) do not represent a secondary combustible beyond those currently analyzed in the FPRA due to the limited

quantities; (5) are considered in the fire modeling input to the FPRA; and, (6) do not affect the plant's ability to contain potentially contaminated water and to monitor smoke.

The NRC staff determined that the proposed change maintains fire protection DID because the insulation materials are not considered a method for preventing fires from starting, or detecting, controlling, or extinguishing fires. In addition, the level of fire protection that will be provided so that a fire will not prevent essential safety functions from being performed is not changed because the limited quantities of insulation materials (only on certain pipes, ducts, beams, etc.), do not impact the availability and reliability of fire protection systems and features.

The NRC staff also determined that the proposed change continues to maintain adequate safety margins. The NRC staff determined that the change does not impact any codes and standards, or their alternatives accepted for use by the NRC because the licensee demonstrated that the insulation materials meet the flame spread and smoke developed criteria in ASTM E-84 and will not support progressive continued combustion. The NRC staff further determined that the change does not impact any safety analysis acceptance criteria used in the licensing basis because the licensee demonstrated that the thermal insulation materials will not compromise automatic or manual fire suppression functions and post fire safe shutdown capability and are bound by the FPRA.

#### 3.4 NRC Staff Conclusion

Based on its review of the information submitted by the licensee, and in accordance with 10 CFR 50.48(c)(2)(vii), the NRC staff concludes that the proposed PB method to justify the continued use of certain thermal insulation materials (polyisocyanurate/foam insulation) is an acceptable alternative to the corresponding NFPA 805, Section 3.3.4 requirement, because it satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release, maintains safety margins, and maintains fire protection DID (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of Alabama official was notified of the proposed issuance of the amendments on June 25, 2019. On June 25, 2019, the State official confirmed that the State of Alabama had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to the 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 amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on February 12, 2019 (84 FR 3510). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 6.0 CONCLUSION

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

## 7.0 REFERENCES

- 1 Wheat, Justin, Southern Nuclear Operating Company, letter to U.S. Nuclear Regulatory Commission, "Joseph M. Farley Nuclear Plant Request for License Amendment for Performance-Based Fire Protection Alternative for Thermal Insulation Material," December 14, 2018 (ADAMS Accession Number ML18348A733).
- 2 National Fire Protection Association, (NFPA 805) "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," Standard 805, 2001 Edition, Quincy, Massachusetts.
- 3 U.S. Nuclear Regulatory Commission, Regulatory Guide 1.205, Revision 1, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," December 2009 (ADAMS Accession No. ML092730314).
- 4 Nuclear Energy Institute, NEI 04-02, Revision 2, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," Washington, DC, April 2008 (ADAMS Accession No. ML081130188).
- 5 ASTM International, "Standard Test for Surface Characteristics of Building Materials," Standard E-84 (ASTM E-84), West Conshohocken, Pennsylvania.

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Date: July 30, 2019

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2 – ISSUANCE OF AMENDMENTS RE: PERFORMANCE-BASED FIRE PROTECTION ALTERNATIVE FOR THERMAL INSULATION MATERIAL (EPID L-2018-LLA-0566) DATED JULY 30, 2019

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