

**ATTACHMENT 2**  
**REGULATORY ANALYSIS**

## REGULATORY ANALYSIS

### REVISION TO 10 CFR 50.48, "FIRE PROTECTION"

#### 1. Action

The U.S. Nuclear Regulatory Commission (NRC) is amending the fire protection requirements for nuclear power reactors in 10 CFR 50.48. The final rule gives holders of operating licenses for light-water reactors the option to voluntarily adopt the set of fire protection requirements contained in the national consensus standard promulgated by the National Fire Protection Association (NFPA), "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition" (NFPA 805), as an alternative to the existing fire protection requirements of 10 CFR 50.48(b), or existing fire protection license conditions or technical specifications. The final rule also allows for a fire protection program that complies with the fire protection requirements of NFPA 805 to be acceptable for decommissioning plants to comply with the requirements of 10 CFR 50.48(f).

#### 2. Statement of the Problem

Holders of operating licenses for light water reactor are currently required to comply with 10 CFR 50.48, which in turn requires licensees to comply with GDC 3 and either the fire protection requirements of Appendix R to 10 CFR Part 50, or licensing conditions and technical specifications developed for the given facility on the basis of similar requirements contained in the NRC's Standard Review Plan (NUREG-0800). All light water reactor licensees are required to comply with 10 CFR 50.48(f) when permanently ceasing operations (i.e. submitted a written certification to the NRC in accordance with 10 CFR 50.82(a)(1)). The current deterministic fire protection requirements are prescriptive in nature. Licensees have requested and received more than 900 exemptions to those requirements. The processing of these exemption requests has placed a significant burden on the resources of the NRC.

Instead of the prescriptive, deterministic requirements in Appendix R, or NRC staff reviews under NUREG-0800, the final rule establishes an alternative, less burdensome regulatory structure for fire protection. The final rule permits licensees to voluntarily adopt NFPA 805, which would give licensees the option to use a performance-based and risk-informed approach to change the fire protection configurations and procedures of their light water reactor electric generating plants. This alternative regulatory structure will likely reduce the number of future licensee exemption or deviation requests related to fire protection changes in licensed reactor facilities, and permits licensees to apply acceptable analytical methods and approaches to establish and/or change reactor plant configurations and procedures to meet the performance objectives of NFPA 805.

#### 3. Objectives

This amendment has the following objectives:

- (1) Provide licensees with a set of performance-based and risk-informed fire protection requirements for changing the fire protection configurations of light water reactor electric generating plants.
- (2) Comply with the Commission's direction to increase industry involvement by working with industry in the development of NFPA 805, 2001 Edition, in the regulation of nuclear

power reactors in accordance with the Commission's Direction Setting Issue (DSI) 13, "The Role of Industry."

- (3) Reduce the number of exemption or deviation requests to the requirements in 10 CFR 50.48, 10 CFR Part 50, Appendix R, fire protection technical specifications, license conditions, and orders.
- (4) Achieve a main technology transfer goal of Public Law 104-113, "National Technology Advancement and Transfer Act of 1995."

#### **4. Backfit Rule Considerations**

The NRC assessed the action for backfit considerations and determined that the final rule does not include any backfits as defined in 10 CFR 50.109(a)(1). Licensees are permitted, on a voluntary basis, to adopt NFPA 805, as excepted, as an alternative set of fire protection requirements. Alternatively, licensees may continue to comply with existing fire protection requirements. These licensees would not need to take any action as a result of the rule change.

#### **5. Alternatives**

Three alternatives were considered:

Alternative 1 - Make no change to 10 CFR 50.48.

This is the no-action option (the status quo). It results in licensees continuing to submit requests for exemptions or deviations, with the NRC conducting reviews of the exemption or deviation requests. It results in no incremental change in costs or benefits to licensees or the NRC. It is the base case used to compare costs and benefits of the other alternatives.

Alternative 2 - Approve NFPA 805, a national consensus standard, as an acceptable alternative to the requirements in 10 CFR 50.48 (b) and (f).

Licensees choosing to use the flexibilities provided by the rulemaking could use risk-informed and performance-based approaches and methods in NFPA 805 rather than submitting an exemption or deviation request each time they wish to depart from current requirements. By using the inherent flexibility of a performance-based regulatory approach, licensees may reduce costs over the lifetime of the plant.

It is difficult to estimate the cost benefits for licensees that implement NFPA 805 and acceptable fire protection approaches because the cost benefits depend on the number of licensees adopting NFPA 805, the cost-benefit of the fire protection approaches, and the number of years that the licensees would derive benefits. Discussions with industry representatives indicate that the cost benefits expected from implementing the rule would be sufficient to cause 20 to 25 licensees to adopt the NFPA 805 regulatory structure. Because the rule change applies to decommissioned plants as well as operating plants, the benefits derived from the rule change would also extend to reactor plants permanently ceasing operations who choose to implement a fire protection program that complies with NFPA 805.

Alternative 3 - Develop a separate NRC fire protection standard.

In this case, the expected outcome would be similar to or the same as allowing licensees to adopt NFPA 805 (Alternative 2). This is because (1) the basic principles that the NRC would use to develop a separate standard are the same as those principles used to develop NFPA 805, and (2) the NRC staff participated in the development of NFPA 805, and the logical processes and technical considerations used in the development of an NRC-developed approach would, therefore, likely result in a standard with requirements similar to those in NFPA 805. This approach would likely be inconsistent with the requirements of the National Technology Advancement and Transfer Act of 1995. This approach would also require an additional expenditure of NRC resources, as well as additional time to develop the NRC standard.

## 6. Estimated Consequences

Alternative 1 - Make no change to 10 CFR 50.48.

This is the status quo, for which there are no incremental costs or benefits.

Alternative 2 - Approve NFPA 805, a national consensus standard, as an acceptable alternative to the requirements in 10 CFR 50.48(b) and (f).

Each licensee choosing to implement the NFPA 805 fire protection requirements would have to conduct a one-time, plant-wide analysis of its fire protection systems, fire barriers, equipment, features, and procedures to establish that they meet the newly adopted standard. The costs of this analysis are estimated to be about \$1.68M for each facility that adopts the new standard. Recordkeeping requirements under NFPA 805 are similar to existing requirements and therefore ongoing recordkeeping costs under the NFPA 805 fire protection requirement are estimated to be the same as for the existing requirements.

Fire protection systems, equipment, and features identified as no longer required will likely be abandoned in place or continued to be used if the licensee determines it beneficial to do so. A cost benefit would be the elimination of recurring operating, training, and maintenance costs related to the existence of fire protection-related systems, equipment, and features that are no longer required.

For new performance-based and risk-informed systems, equipment, features, and procedures, there will be a plant-specific, one-time cost for their establishment (which can not be estimated with any certainty), in addition to recurring operating, training, and maintenance costs. However, licensees are expected to implement such systems and features only if the licensee determines them to be cost beneficial versus costs of continuing to meet existing deterministic requirements.

A benefit of the rule change to both licensees and the NRC would be the elimination of the need for exemption requests from existing deterministic requirements.

Although the costs and benefits discussed above cannot be estimated with any certainty, the proposed rulemaking, overall, is cost-beneficial because licensees who choose to adopt the

new standard will do so when they determine that the benefits (in terms of ongoing savings) outweigh the one-time implementation costs. Licensees not adopting NFPA 805 will see no change in costs as they will continue to operate under their existing licensing basis.

Alternative 3 - Develop a separate NRC fire protection standard.

In addition to the costs and benefits discussed for Alternative 2 (above), the NRC would incur an extra cost for developing a new standard to use in lieu of NFPA 805. Further, it would take additional time to develop a separate NRC standard.

## **7. Decision Rationale**

Of the alternatives above, Alternative 2 is considered preferable. Alternative 2 would change the rule to allow licensees to voluntarily adopt NFPA 805, as excepted, as an alternative to the fire protection requirements of Sections 50.48 (b) or existing license conditions or technical specifications, and to comply with Section 50.48(f). This proposed change is considered to be a relaxation of requirements to the extent that it would allow licensees to use risk-informed and performance-based methods that meet the goals, objectives, and performance criteria of NFPA 805, in lieu of meeting the deterministic requirements contained in Appendix R to 10 CFR Part 50 or similar requirements resulting from the license review process for reactor plants licensed after January 1, 1979. Alternative 2 provides a more flexible regulatory structure that will allow some licensees to reduce their regulatory burden without increasing the burden to licensees not adopting NFPA 805.

Because licensees will likely adopt the alternative standard for fire protection only if they determine they will realize a net reduction in regulatory burden, and because the regulatory burden of licensees not adopting the NFPA 805 standard is unchanged, Alternative 2 results in a potential reduction in regulatory burden for some licensees with no increase in regulatory burden for other licensees. This result is considered superior to the no-action alternative (Alternative 1). Alternative 3 would result in a similar state of fire protection regulation as Alternative 2, however, Alternative 3 has additional costs without additional benefits.

Alternative 2 would not be an interim measure, although it is possible that the NRC could develop another voluntary alternative or endorse another industry consensus standard should one be developed and found to be technically acceptable.

Section 7.1 through 7.4 below discuss the decision criteria and goals that the NRC considered in making this determination.

### **7.1 Maintain Public Health and Safety**

The NRC has determined that public health and safety and the common defense and security would continue to be adequately protected under this rule. This determination is based, in part, on the goals, objectives, and performance criteria specified in Chapter 1 of NFPA 805. Those goals, objectives, and performance criteria provide for defense-in-depth to control fires; prevention of radioactive releases that adversely affect the public; and control of plant reactivity, inventory, and pressure, as well as decay heat removal, vital auxiliaries, and process monitoring.

As stated in Section 2.4.4 of NFPA 805, the plant change evaluation process must consist of an integrated assessment of the acceptability of risk, defense-in-depth, and safety margins. This approach requires engineering evaluations to assess the adequacy of the fire protection elements (e.g., combustible and ignition control, fire detection and suppression, and fire confinement) and the nuclear safety element (e.g., post-fire safe shutdown capability), to ensure that the defense-in-depth philosophy is maintained. The NFPA 805 approach also includes requirements for the application of acceptable codes and standards to assess the calculated margin between designed and qualified fire protection features versus specified nuclear safety and radioactive release performance criteria, as well as provisions for evaluating acceptable change in risk in terms of Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) based on risk acceptance guidelines as presented in NRC Regulatory Guide 1.174. (For example, when the calculated risk increase is in the range of  $10^{-6}$  per reactor year to  $10^{-5}$  per reactor year, the increase is acceptable if it can be reasonably shown that the total CDF is less than  $10^{-4}$  per reactor year.)

Chapters 1 and 2 of NFPA 805 specify measurable or calculable parameters and objective nuclear safety and radioactive release performance criteria; provide flexibility for the program, processes, and analytical approach; and ensure that a performance failure will not result in an immediate safety concern (through application of the fire protection defense-in-depth philosophy and the assurance of adequate safety margins). Potential performance failures are assessed in advance to determine that the licensee is capable of detecting the performance failure and that adequate time is available to take corrective actions upon detection.

In summary, the overall approach of NFPA 805 is consistent with the key principles for evaluating licensing basis changes as described in NRC Regulatory Guide 1.174. Namely, the proposed change is consistent with defense-in-depth philosophy, maintains sufficient safety margins, and, when the proposed change results in an increase in CDF or risk, the increase is small and consistent with the intent of the Commission's Safety Goal Policy Statement. Therefore, the concepts and processes in NFPA 805 comprise a risk-informed, integrated, performance-based decision making process for evaluating plant changes related to fire protection systems and features.

## **7.2 Reduce Unnecessary Burden**

This rule would reduce the need for licensees adopting NFPA 805 to develop exemption requests targeted at obtaining relief from the existing deterministic fire protection requirements. Additionally, the increased regulatory flexibility resulting from this rule is expected to result in a net reduction in operating, training, and maintenance costs over the remaining life and decommissioning of the plants.

## **7.3 Increase Public Confidence**

NFPA 805 reflects the most recent fire protection recommendations of the National Fire Protection Association for existing light water electric generating plants. This rule allows licensees to use risk-informed and performance-based approaches to more appropriately allocate fire protection resources on the bases of risk information, while maintaining NRC oversight of reactor fire protection configurations and licensee fire protection activities (see Section 8 below).

## 7.4 Increase NRC Efficiency and Effectiveness

This rule takes advantage of the involvement of the NRC staff in the development of NFPA 805, 2001 Edition, and would reduce the NRC resources needed to process exemption requests related to the existing deterministic, prescriptive fire protection requirements.

## 8. Implementation

The NRC will implement this change by an amendment to the current requirements in 10 CFR 50.48 to allow licensees to voluntarily adopt NFPA 805. This rule would become effective 30 days after being published.

A licensee may undertake the implementation of NFPA 805 by performing an assessment of its facility for compliance with NFPA 805, as excepted, and identifying changes and completing actions necessary to bring the facility into compliance. The rule language states that an adopting licensee must complete its implementation of the methodology in Chapter 2 of NFPA 805 (including all required evaluations and analyses) and modify the fire protection plan required by paragraph (a) of 10 CFR 50.48 to reflect the licensee's decision to comply with NFPA 805. Licensees must submit a request in the form of an application for license amendment under 10 CFR 50.90. The application must identify orders and license conditions that must be revised or superseded and contain any necessary revisions to the plant 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.

The NRC will inspect a licensee's compliance with NFPA 805, as excepted, as part of its normal oversight processes.

## 9. References

SECY-02-0132, "Proposed Rule: Revision of 10 CFR 50.48 to Permit Light-Water Reactors to Voluntarily Adopt National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants, 2001 Edition" (NFPA 805) as an Alternative Set of Risk-Informed, Performance-Based Fire Protection Requirements," dated July 15, 2002.

SECY-98-0058, "Development of a Risk-Informed, Performance-Based Regulation for Fire Protection at Nuclear Power Plants," dated March 26, 1998.

U.S. Code of Federal Regulations (CFR), Title 10, Section 50.48, "Fire protection," 65 FR 38190, June 20, 2000.

U.S. Code of Federal Regulations (CFR), Title 10, Section 50.90, "Application for Amendment of License or Construction Permit."

U.S. Code of Federal Regulations (CFR), Title 10, Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979."

U.S. Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," NUREG-0800, 1987.

U.S. Nuclear Regulatory Commission, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission, NUREG/BR-0058, Revision 3, June 2000,

U.S. Nuclear Regulatory Commission, "Regulatory Analysis Technical Evaluation Handbook," NUREG/BR-0184, Final Report, January 1997.

Office of Management and Budget, "Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities," OMB Circular NO. A-119, Revised, February 10, 1998.

National Fire Protection Association (NFPA), Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition," NFPA, Quincy, MA.