

**DRAFT NFPA 805 TRANSITION**  
**PILOT PLANT OBSERVATION GUIDANCE**

**I. INTRODUCTION**

The Commission's requirements for fire protection of nuclear power plants allow licensees to voluntarily adopt a risk-informed, performance-based approach according to the provisions of National Fire Protection Association (NFPA) Standard NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Electric Generating Plants," 2001 Edition, as endorsed in 10 CFR 50.48(c). To adopt NFPA 805, the licensee must implement the requirements of NFPA 805 and submit a license amendment request that revises the fire protection license condition, and identifies any necessary changes to fire protection orders and technical specifications. There is no requirement within the rule to submit the revised fire protection program or supporting documentation for NRC review and approval. The NRC will verify compliance with 10 CFR 50.48(c) through the normal inspection process. Voluntary pilot plant observation visits are planned for the first few plants that submit license amendments to adopt NFPA 805. Nuclear Energy Institute (NEI) is considering conducting several implementation pilots in which the NRC Staff may be observers. This guidance is for NRC sponsored pilots and will assist the NRC Staff in performing on-site observations of the licensee's implementation of NFPA 805. The information, results, and experience from these visits will be documented in a NFPA 805 transition pilot report to provide lessons learned for follow-on licensees. In addition, the pilots may be used to update the implementation regulatory guide, standard review plan and/or inspection procedures, as appropriate.

**II. BACKGROUND**

The fire protection rule, 10 CFR 50, §50.48, "Fire protection," establishes the NRC's requirements for fire protection of nuclear power plants. Paragraph §50.48(c) allows licensee's of operating nuclear power plants to maintain a fire protection program that complies with the provisions of National Fire Protection Association (NFPA) Standard NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Electric Generating Plants," 2001 Edition, as an alternative to meeting the requirements of Paragraph §50.48(b).

Licensees that choose to adopt NFPA 805, are required to submit a license amendment request in accordance with §50.48(c)(3)(i) and to transition the existing fire protection program to a program based on NFPA 805. This transition should be completed before the new program is implemented [See §50.48(c)(3)(ii)]. Draft Regulatory Guide (DG-1139), "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," provides one approach for compliance with 10 CFR 50.48(c) and NFPA 805. The draft endorses, with exceptions, the implementing guidance of Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," Revision F.

As stated in DG-1139, Section B, “Discussion,” the staff endorses a “safe-today, safe-tomorrow” approach for plants that transition to a risk-informed, performance-based fire protection program in accordance with 10 CFR 50.48(c). The overall objective of this approach is to enable licensees to transition to a risk-informed, performance-based fire protection program without undue burden of re-analyzing or re-validating approved fire protection program elements, design features, or safe shutdown analyses. The application of this approach to the licensee implementation of NFPA 805 is discussed in this plan, as appropriate to the fire protection program elements being observed. Plant features that are not in compliance with their current licensing basis and have not been formally accepted by the NRC via the exemption/license amendment process should not transition as part of the “safe-today, safe-tomorrow” philosophy. The intention would be to have such items identified during the transition and placed in the licensee’s corrective action program.

This guidance generally follows the format of a Standard Review Plan with some changes to accommodate the approach. Areas to be observed are summarized in the Areas of Observation, Section V. Section VI, Observation Criteria, describes basis for the guidance. The subsections of Section VII, Observation Procedures generally correspond with the subsections of Section V and provide more detailed discussion of observation topics. Section VIII, Observations describes the expected output of the visit and disposition of any identified issues.

### **III. APPLICABILITY**

This guidance will be applied voluntarily by the NRC to at least the first two applicants that submit license amendment requests to revise the plant fire protection program to comply with 10 CFR 50.48(c). The objective of the guidance is to assist the NRC staff in reviewing the licensee’s implementation of NFPA 805 in support of improving transition guidance. Observations will be published for use by subsequent applicants during their transition process. Subsequent licensees implementation of NFPA 805 will be reviewed by the NRC during normal triennial inspection of the fire protection program.

### **IV. OBSERVATION TEAM**

The team should be composed of persons with the expertise necessary to support the specific plant review. As a minimum, the team should include NRC fire protection staff familiar with the requirements of NFPA 805 and the associated guidance in applicable regulatory guides and NEI implementation guidance NEI 04-02. Where transition of the licensee’s program involves additional engineering analysis, expertise in the specific engineering or analytical methods should be included on the team. This may include expertise in fire modeling, probabilistic risk assessment, plant systems and operations, circuit analysis, and safe shutdown analysis. The licensee’s transition report may be voluntarily submitted and used as a basis for establishing the scope and the necessary expertise of the team.

### **V. AREAS OF OBSERVATION**

The following paragraphs summarize the general fire protection program areas or features that should be observed in the licensee’s implementation of NFPA 805 to determine the acceptability

of the revised fire protection program to meet the specific provisions of the standard. The primary areas of observation have been organized into four general sections that include the transition licensing process, the fundamental fire protection program and design elements, nuclear safety capability, and fire protection program management.

The license process section is intended to cover the licensing and regulatory processes and procedures associated with transition of the existing fire protection program to a revised program that complies with 10 CFR 50.48(c). The fundamental fire protection program and design element section provides for observations of specific aspects of the licensee fire protection program and plant fire protection design elements as compared to the provisions of NFPA 805. The nuclear safety capability section provides for observations of the plant design and technical analyses that demonstrate the nuclear goals, objectives, and performance criteria of NFPA 805 are met for all modes of operation. The fire protection management section observes the licensee's methods and documentation for managing and maintaining the fire protection program. The observation team will use a method of sampling the various areas to verify the transition was viable and complete.

## **1. Fire Protection License Process**

The team should review the fire protection program documentation to determine that the licensee has addressed the requirements of 10 CFR 50.48(c) within the plant license and fire protection program.

- a. License Change Request. 10 CFR 50.48(c)(3)(i) requires the licensee to identify any orders or license conditions that must be revised or superseded, and to provide any necessary revisions to the plant technical specifications and the bases thereof. The licensee's proposed changes and the process and method for identifying the affected documents should be sampled to determine that these changes are complete and thorough. If there are no change requests, the team will sample just the process and methods used to identify license change requests.
- b. Risk-Informed, Performance-Based Alternatives. 10 CFR 50.48(c)(2)(vii) allows licensees to use performance-based methods to demonstrate compliance with NFPA 805, Chapter 3, requirements, and 50.48(c)(4) allows licensees to use risk-informed, performance-based alternatives to comply with NFPA 805. Both paragraphs require a license amendment request that demonstrates the performance/risk criteria are met, as well as defense-in-depth and safety margins are maintained. The license may combine the request to transition to NFPA 805, Chapter 3 alternatives and alternative approaches into the same license amendment request. Where licensees propose to apply alternative approaches allowed by the rule, that have not been previously approved by the staff, the underlying technical bases should be sampled by the team to determine acceptability of the approach. The results may be used in support of license amendment approval.
- c. Previously Approved Exemptions, Deviations, and Other Program Elements. It is expected that a significant portion of the licensee's pre-NFPA 805 fire protection program will be transitioned directly with little or no modification to the NFPA 805 fire

protection program. Under the philosophy of “safe-today, safe-tomorrow,” as discussed in Section II above, re-validation/verification of previously approved aspects of the licensee’s fire protection program are unnecessary. However, the team should sample the licensee’s documentation to provide assurance that the basis for the “pre-approval” is adequately documented. (Reference DG-1139, Position 2.3)

- d. Transition Compliance and Enforcement. The licensee’s Letter of Intent (Reference NEI 04-02, Section 4.2.2) and the activities to transition the plant fire protection program and design to NFPA 805 may result in identification of conditions of non-compliance with the fire protection program or licensing basis that may be subject to enforcement discretion in accordance with the Commission’s interim enforcement policy, NUREG-1600 (Also see Federal Register Notice, 69 FR 33684, and DG-1139, Position 2.1). Implementation of NFPA 805 should address the non-compliant conditions. The team should sample the licensee’s results for non-compliant items to verify corrective action was appropriate and that compliance was achieved.

## **2. Fire Protection Program and Design Elements**

Chapter 3 of NFPA 805 describes the required fundamental fire protection program and design elements such as:

- a. the fire protection plan (e.g., management and procedures);
- b. fire prevention practices and controls (e.g., control of combustibles and ignition sources);
- c. brigade and firefighting capability (e.g., training, equipment, drills, & mutual aid);
- d. fire suppression (e.g., water supply, automatic and manual system design and operation);
- e. fire detection and alarm; and
- f. passive fire protection features (e.g., fire barriers).

The observation should check the acceptability of the licensee’s fire protection program and plant fire protection design elements relative to the provisions of NFPA 805, Chapter 3. Licensee documentation should identify those elements that deviate from NFPA 805, but were previously approved by the NRC for the purposes of transitioning the fire protection program to NFPA 805. The team should review an appropriate sample of the previously approved program and design elements, particularly those based on licensee approval under the provisions of Generic Letter 86-10 or 10 CFR 50.59 processes and procedures (Reference NEI 04-02, Section 4.3.1). Where compliance with the fire protection elements were not previously approved by the NRC, a license amendment request may be needed per 10 CFR 50.48(c)(2)(vii).

## **3. Nuclear Safety Capability**

The nuclear safety capability area of observation should include licensee documentation that demonstrates nuclear safety capability is achieved for the transitioned plant. This review may include the licensee’s design documentation, engineering analyses and procedures that demonstrate the capability of the plant to meet the nuclear safety goals, objectives, and performance criteria of NFPA 805, Chapter 1. The licensee may use deterministic methods

similar to existing requirements (i.e., Appendix R or Branch Technical Position (BTP) CMEB 9.5-1) or risk-informed, performance-based methods. Specific areas of review include:

- a. Deterministic Approach. Review the application of deterministic methods of NFPA 805, Paragraphs 2.2.6 and 4.2.3. The deterministic criteria of NFPA 805 are similar to existing criteria (e.g., Appendix R (III.G.2)) and in many cases, the licensee will likely rely on existing analysis to demonstrate compliance with NFPA 805 nuclear safety performance criteria. Following the “safe-today, safe-tomorrow” philosophy (See Section II above), review of fire areas transitioned under the deterministic methods is expected to be minimal, particularly those identified in the licensee documentation as pre-approved. The review should include the licensee’s comparison of the current and NFPA 805 deterministic criteria as it applies to a given fire area and verification that the NFPA 805 criteria are met (Reference NEI 04-02, Section 4.3.2).
- b. Risk-Informed, Performance-Based Approach. Review the application of risk-informed, performance-based methods of NFPA 805, Paragraphs 2.2.8 and 4.2.4, including defense-in-depth and margin-of-safety determinations. Fire modeling, probabilistic safety assessments (PSA) and other engineering analyses should be described by the licensee within their transition report. The specific methods, applications and analyses should be reviewed as necessary to determine acceptability (See NFPA 805, Section 2.4.1.2 and 2.4.3; DG-1139, Position C.4).
- c. Non-power Operating Modes. NFPA 805 applies to all modes of operation (See NFPA 805, Section 1.1). The review should include the licensee’s analyses and procedures supporting fire protection of key safety functions associated with “high risk evolutions” during shutdown operations (See NEI 04-02, Section 4.3.3).
- d. Radiation Release. The review should include analysis of fire protection capability to minimize fire-related radiation release per NFPA 805, Paragraph 4.3. The application should describe sources of radioactive material release during fires, confinement capability, and the procedures (e.g., operational and firefighting) to minimize the potential for release and to meet the performance criteria (See NFPA 805, Section 1.5.2; DG-1139, Position 3.3 and NEI 04-02, Section 4.3.4).

#### **4. Fire Protection Program Management**

The fire protection program should describe the methods for maintaining the program documentation, engineering analyses, and plant design basis associated with the transition to, and final implementation of NFPA 805, including the provisions of NFPA 805, Paragraphs 2.2.9, 2.4.4, 2.6 and 2.7 and DG-1139, Position 3.

- a. Plant Change Evaluation. NFPA 805, Paragraph 2.4.4, contains a provision for performing evaluations for changes to the approved fire protection program. This provision takes the place of 10 CFR 50.59 as previously applied in the standard license condition (Reference Generic Letter 86-10). The observation should check the licensee’s

process for performing change evaluations in accordance with NFPA 805 and DG-1139, Position 3.1.

- b. Monitoring. The licensee's processes and procedures should be reviewed relative to the monitoring requirements of NFPA 805, Paragraph 2.6 and guidance in DG-1139, Position 3.1.3 and NEI 04-02, Section 4.5.3.
- c. Program Documentation, Configuration Control, and Quality. The fire protection program documentation, and the licensee's methods and procedures for configuration control and for meeting the quality requirements of NFPA 805, Section 2.7, and guidance in DG-1139, Position 3.2 and NEI 04-02, Sections 4.5.1 and 4.5.2, should be sampled.

## **VI. OBSERVATION CRITERIA**

The following references contain the criteria for determining the acceptability of the licensee's fire protection program to meet the risk-informed, performance-based, requirements of NFPA 805, and will form the basis for any observations made during the NRC pilot plant observation visits:

1. 10 CFR 50.48, "Fire Protection." Paragraph §50.48(a) establishes the requirements for a fire protection plan that meets General Design Criterion (GDC) 3, and §50.48(c) establishes the requirements for use of NFPA 805 as an alternative to §50.48(b).
2. 10 CFR 50, Appendix A, GDC 3, "Fire Protection," establishes the criteria for the fire and explosion protection of structures, systems, and components important to safety. GDC 3 also establishes the criteria for fire detection and fire fighting systems and the use of noncombustible and heat resistant materials throughout the unit.
3. 10 CFR 20, "Standards for Protection Against Radiation," (as specified in NFPA 805, Section 1.5.2), establishes the radiation release limits used as NFPA 805 performance criteria.
4. National Fire Protection Association Standard NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, establishes the fire protection requirements for plants that choose to comply with the requirements of §50.48(c), subject to the exceptions listed in §50.48(c)(2).
5. Draft Regulatory Guide DG-1139, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Draft for Comment, September 2004, provides NRC guidance on an acceptable approach to meeting NFPA 805 including endorsement (with exceptions) of NEI 04-02, Revision F. The Regulatory Guide also identifies analytical methods that have been evaluated by the staff and determined to be acceptable for the performance of fire modeling and probabilistic safety assessments (PSAs).

6. Nuclear Energy Institute NEI 04-02, “Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c),” Revision F, provides guidance to licensees for transition of the existing fire protection program to one that complies with NFPA 805 as endorsed by 10 CFR 50.48(c).
7. Regulatory Issue Summary 2004-03, Revision 1, December 29, 2004, “Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Inspections.”
8. NEI 00-01, “Guidance for Post-Fire Safe Shutdown Analysis,” Rev. 1, November 2004 (subject to staff exceptions or clarifications, See DG-1139, Position 4.4) provide guidelines for performing circuit analysis in support of demonstrating that nuclear safety performance criteria are met.
9. NUREG-1600, “General Statement of Policy and Procedure for NRC Enforcement Actions,” “Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48),” provides the Commission’s policy on enforcement discretion for non-compliant conditions, either existing or identified during transition to a risk-informed, performance-based fire protection program per 10 CFR 50.48(c). (Also see Federal Register Notice 69 FR 33684; DG-1139, Background discussion and Position 2.1).

The acceptance criteria cited above are directly associated with the adoption of NFPA 805. In transitioning to NFPA 805, a licensee may choose to retain elements of the existing fire protection program that have been previously approved by the staff (e.g., in a Safety Evaluation Report) or otherwise determined to be acceptable by the licensee (e.g., engineering analyses performed in accordance with Generic Letter 86-10). The acceptance criteria (e.g., GL 86-10, SERs, and 10 CFR 50.59 evaluations) that establish the acceptability of each of these elements under NFPA 805 should be documented by the licensee in the transition report or fire protection program design basis documentation required by NFPA 805 or developed in accordance with the guidelines of NEI 04-02.

## **VII. OBSERVATION PROCEDURES**

The procedures below generally correspond with, and expand upon, the Areas of Observation in Section V, and specify those elements of the fire protection program that should be considered in evaluating the acceptability of the licensee’s fire protection program in meeting the Observation Criteria. The personnel performing the observations may select and emphasize individual procedures as appropriate to the scope of review and specific to the licensee’s approach to implementation of NFPA 805.

### **1. Fire Protection Licensing Process**

In support of license amendment approval, the observer should sample the underlying technical basis supporting the license amendment requests submitted to the NRC to adopt NFPA 805, and/or to use alternatives to the specific provisions of NFPA 805.

- a. License Change Request. The licensee's proposed NFPA 805 license condition(s), Technical Specification changes, and fire protection program should be sampled to determine that the licensee has established a clear commitment to comply with 10 CFR 50.48(c) and NFPA 805. The license amendment and fire protection program documentation should be sampled to determine if the licensee's proposed changes are appropriate and acceptable.

A clear understanding of the pre-NFPA 805 fire protection licensing basis for the plant will assist the observer in sampling the completeness, adequacy, and acceptability of the proposed NFPA 805 fire protection program. The licensee will likely retain a significant portion of the existing fire protection program and design basis. Where elements of this existing program do not comply with the specific provisions of NFPA 805, the licensee may cite NRC documents or records [e.g., Safety Evaluation Reports (SERs)] or internal licensee analyses as the technical basis for pre-approval of the non-complying conditions. A sampling of these documents should be reviewed to substantiate the NRC approved conditions as cited by the licensee. Identification of previously approved fire protection program elements is also necessary for implementation of the change evaluation process (Reference NFPA 805, Sections 2.2.9 and 2.4.4).

The transition report developed in accordance with NEI 04-02, as endorsed by DG-1139, provides an approach as to how the licensee can identify the necessary changes to the fire protection program. This report may be used to direct the review of the licensee process for identifying the changes and the completeness of the information provided in the amendment request.

- b. Risk-Informed, Performance-Based Alternatives to NFPA 805. 10 CFR 50.48(c) contains provisions that allow licensees to propose performance-based alternatives to meeting the specific requirements of NFPA 805. 10 CFR 50.48(c)(2)(vii) takes exception to the prohibition in NFPA 805, Section 3.1, against the use of performance-based methods, and allows performance-based methods to be used in demonstrating compliance with the fundamental fire protection program and design elements of NFPA 805, Chapter 3. Use of performance-based methods to satisfy Chapter 3 requires the licensee to submit a license amendment request demonstrating that the method satisfies the requirements of 10 CFR 50.48(c)(2)(vii)(A-C). Use of risk-informed or performance-based alternatives to other provisions of NFPA 805 also requires an amendment request that demonstrates the methods meet the criteria specified in §50.48(c)(4)(i-iii).

The observer should review the underlying technical basis for the license amendment requests and confirm that the alternatives satisfy the performance criteria (NFPA 805, Section 1), risk assessment, defense-in-depth, and safety margin provisions of the rule. Alternative analytical methods not endorsed by DG-1139 should be reviewed against the quality standards established in NFPA 805, Section 2.7.3. Defense-in-depth analyses should be reviewed against the criteria in NFPA 805, Section 1.2 and NEI 04-02. Additional discussion on evaluating safety margins is provided in NFPA 805, Appendix A, A.2.4.4.3.

- c. Previously Approved Exemptions, Deviations, and Other Program Elements. In following the “safe-today, safe-tomorrow” philosophy (Reference DG-1139, Section B), the implementing guidance of DG-1139 and NEI 04-02 (Reference NEI 04-02, Section 2.3) allows licensees to retain those fire protection program elements that were previously approved by the staff. These elements do not require re-evaluation except to the degree necessary to determine that the previously approved conditions are still relevant and representative of the current plant operations and configurations, and that the cited staff approval basis is properly applied.

The licensee transition report or fire protection program documentation may also cite licensee-performed analyses as the basis for pre-approved conditions. Examples may include analyses performed in accordance with NRC sanctioned processes such as Generic Letter 86-10 evaluations, or 10 CFR 50.59 safety evaluations. These analyses are typically not NRC approved but may contain adequate technical basis for transitioning a fire protection program or design element to the NFPA 805 based program. The observer should sample the adequacy/acceptability of these analyses as basis for transitioning the specific fire protection element.

- d. Transition Compliance and Enforcement. In accordance with the Commission’s interim enforcement criteria (See Observation Criteria VI.8) the licensee may have requested enforcement discretion for existing non-compliant conditions and newly found non-compliant conditions during the transition to NFPA 805. Any non-compliance conditions existing prior to, or occurring during the transition should have been entered into the corrective action program and appropriate compensatory measures should have been established per licensee’s procedures (Reference NEI 04-02, Section 2.3.3). These non-compliant conditions should be resolved as part of the implementation of NFPA 805 either through analysis or coming into compliance. In support of recommending approval of the licensee’s amendment request to adopt NFPA 805, the observer should sample the licensee’s resolution of the non-compliant conditions for which enforcement discretion was given, and determine that the item is in the licensee’s corrective action program or compliance is adequate. Full compliance may not have been achieved at the time of the site visits and the license amendment request should contain an appropriate schedule for coming into full NFPA 805 compliance.

Enforcement discretion can be extended during NRC review of the amendment request. In this case, for those non-compliant conditions that have not been resolved at the time of the review, the review should determine that proposed resolutions are appropriate, compensatory measures are adequate, and that safety will be maintained until compliance is achieved.

## **2. Fire Protection Program and Design Elements**

The licensee’s documentation describing the transition of the fundamental fire protection program and design elements (Reference NFPA 805, Chapter 3) should be reviewed.

- a. Fire Protection Program and Design Element Comparison. The licensee transition documentation should provide a comparison of the licensee's fire protection program and design elements with the specific provisions of NFPA 805 Chapter 3 (See NEI 04-02, Section 4.3.1 and Appendix B-1). The reviewer should identify where the licensee has deviated from the provisions of NFPA 805 and determine if these deviations are adequately justified by the licensee. Justification may be documented evidence of previous staff approval (see VII.1.c above).

Elements of the fire protection program or plant design that the licensee has designated as NRC previously approved should be sampled to determine the basis of the approval and whether the approval remains valid in the context of meeting NFPA 805. For example, past approvals may be based on engineering analyses or assumptions to support deterministic requirements under the pre-NFPA 805 fire protection program, however; these analyses or underlying assumptions may not be applicable under performance-based, risk-informed methods of NFPA 805. The general approval of the licensee's fire protection program or the determination of acceptability of the program in NRC inspection reports is not considered "previous approval" in the context of NFPA 805 unless the specific program or design element has been explicitly approved in these documents.

The licensee should identify those areas where the acceptability of fire protection systems and features has been determined in accordance with the provisions of Generic Letter 86-10, Enclosure 1, the standard license condition, or 10 CFR 50.59. The continued applicability of these engineering analyses under the provisions of NFPA 805 should be established by the licensee (Reference NEI 04-02, Sections 2.3 and 4.3.1) and sampled for adequacy by the observer.

- b. Alternatives to NFPA 805 Program and Design Elements. Where the licensee program or design elements deviate from NFPA 805, Chapter 3, and the deviations do not meet the criteria for previous approval, the licensee may use performance-based methods to justify the deviation as allowed by 10 CFR 50.48(c)(2)(vii). This approach requires the licensee submit a license amendment request. Alternatively, the licensee may request an exemption from the requirement in accordance with 10 CFR 50.12. Where the licensee has used performance-based methods to justify the deviation, the observer should sample the licensee's documentation that demonstrates the following:

- i) The proposed deviation meets the NFPA 805 performance goals, objectives, and criteria (Reference NFPA 805, Chapter 1).
- ii) Safety margins are maintained. Safety margins can be calculated margins between analysis results and performance criteria, or compliance with consensus codes and standards (Reference NFPA 805, Appendix A.2.4.4.3)
- iii) Fire protection defense-in-depth is maintained. The licensee documentation should demonstrate that deviations from the provisions of NFPA 805 do not

adversely impact the ability to meet the defense-in-depth criteria of NFPA 805, Paragraph 1.2.

Where the licensee proposes modifications to address deviations from the fundamental design elements of NFPA 805, Chapter 3, the observer should sample the acceptability of the proposed modifications in meeting the provisions of NFPA 805. In addition, the observer should check any interim compensatory measures necessary to address the deviation to determine if these measures provide adequate protection of the public until the modification is complete.

### **3. Nuclear Safety Capability**

The observer should sample the licensee's safe shutdown analysis (under the pre-NFPA 805 fire protection program), as transitioned, demonstrates that the nuclear safety capability meets the goals, performance objectives, and performance criteria of NFPA 805, Chapter 1. This sampling should encompass the transition of fire areas with deterministic analyses (Reference NFPA 805, Paragraph 2.2.6 and 4.2.3), including Appendix R alternate or dedicated shutdown analyses, and fire areas subject to new analyses using the risk-informed, performance-based methods of NFPA 805.

- a. Transition of Deterministic Fire Area Analyses to NFPA 805. The deterministic approach is identified in NFPA 805, Section 2.2.6, as an acceptable method for demonstrating the nuclear safety capability satisfies the performance criteria. The deterministic requirements are described in NFPA 805, Section 4.2.3. The licensee documentation should identify the fire areas that were transitioned under deterministic provisions of NFPA 805, which are similar to the criteria of 10 CFR 50, Appendix R, Section III.G.2. The specific deterministic requirement applicable to the fire area should be identified along with the nuclear safety capability provided by structures, systems and components (SSCs) located in the area. The specific performance criteria of NFPA 805, Paragraph 1.5, that applies to the SSCs in the area should also be described. Fire areas that meet the deterministic criteria are "deemed to satisfy" the performance criteria without further engineering analysis (Reference NFPA 805, Sections 4.1). Guidance for transition and documentation of deterministic fire areas is contained in NEI 04-02, Section 4.3.2 and Appendix B-2, and may assist in sampling the licensee's documentation.

Where the licensee relies on previously approved conditions, exemptions, or deviations as part of the safe shutdown analysis (under the pre-NFPA 805 fire protection program), and proposes to continue the reliance on these approvals in demonstrating compliance with NFPA 805, the applicability of these conditions in meeting the deterministic criteria under NFPA 805 should be established by the licensee (Reference NEI 04-02, Sections 2.3 and 4.3.2) and sampled by the observer. The level of review should be tempered by the "safe-today, safe-tomorrow" philosophy described in Section B of the DG-1139, and should not be a re-validation of past approvals.

- b. Transition of Alternative and Dedicated Shutdown Areas. The deterministic approach of NFPA 805, Section 4.2.3, correlates closely with the requirements of 10 CFR 50, Appendix R, Section III.G.2, however; this approach has no direct correlation with the alternative and dedicated shutdown requirements of 10 CFR 50, Appendix R, Sections III.G.3 and III.L. As with other fire protection program elements that have been pre-approved, alternative and dedicated shutdown fire areas may be transitioned without re-validation or re-analysis. The observer should check for the pre-approval basis.

If the alternative or dedicated shutdown capability has not been previously approved and requires the use of recovery actions to demonstrate the availability of a success path for meeting the performance criteria, then NFPA 805, Section 4.2.3.1, requires the use of the performance-based approach of Section 4.2.4. The use of performance-based approaches should be reviewed as described in VII.3.c, below.

- c. Fire Areas Using Risk-Informed, Performance-Based Methods and Approaches. The licensee documentation should identify the specific fire areas that were evaluated using risk-informed, performance-based methods and the underlying reason for applying the performance-based approach.

The fire area description should be sampled and should include identification of the nuclear safety capability specifically located in the fire area, or potentially affected by a fire in the fire area, and the applicable performance criteria. The nuclear safety capability descriptions should include identification of systems and equipment as well as circuits located in the area. Circuits should be identified that are necessary to equipment operation as well as those circuits that could prevent operation or cause mal-operation of the nuclear safety capability equipment and systems. (Reference NFPA 805, Section 2.4.2)

The fire hazards in the area should be described in sufficient detail that the observer can check these hazards relative to the configuration of the fire area and the nuclear safety capability contained therein. Fire scenarios, based on the identified hazards, should be described in sufficient detail for the reviewer to evaluate the acceptability of the fire damage conclusions and associated safety margins. (Reference NFPA 805, Section 2.4.1, 2.4.2, and 4.2.4; NEI 04-02, Sections 4.3.2, 5.1.2, Appendices B-2, C, and D).

The licensee documentation should summarize the engineering analysis results that demonstrate that 1) the nuclear safety capability meets the performance criteria; 2) fire protection program and design elements (that deviate from NFPA 805) are acceptable; 3) plant changes do not pose an unacceptable risk; 4) acceptable defense-in-depth is maintained; and 5) acceptable safety margins are maintained. The observer should sample these analyses individually as described in the items below, but also with regard to their interrelationships to one another. For example, fire protection systems and response credited in fire models and risk assessments should be consistent with program and design evaluations associated with NFPA 805, Chapter 3, requirements.

- i) Fire scenarios selected for performance-based analysis, Maximum Expected and Limiting Fire Scenarios, should be described in sufficient detail that the observer can determine the adequacy of these scenarios in modeling the hazards described in the fire area. For example, fire growth rates, heat release rates, and temperatures assumed or calculated in the models should be consistent with the types of combustible materials that are, or may be, present in the area. Heat transfer, ventilation flows, and detection and suppression actuation and damage assessments should be consistent with expected fire conditions, equipment operation, building and equipment design and fire area configuration. Licensee evaluations of equipment damage should include the effects of fire (i.e., smoke, heat, tenability) as well as fire suppression and firefighting activities on the operation of the equipment. The effects considered should be consistent with the type and magnitude of fire assumed in the scenario model. (Reference NFPA 805, Sections 2.4.1, 2.5, 4.2.4.1, Appendix C, and NEI 04-02 Appendix D)
- ii) Fire protection systems and features in the area including suppression systems, detection systems, and fire barriers should be described. The design basis of the systems, the extent of coverage, and the configuration of the systems relative to fire hazards and nuclear safety capability should be described. Potential impact of the suppression systems on nuclear safety system and equipment operation should be described. (Reference NFPA 805, Section 2.4.1.4 and 4.2.4.1.5, and NEI 04-02 Appendices B-2 and D)

Where the licensee relies on previous engineering evaluations (e.g., per Generic Letter 86-10) to justify partial area coverage by detection and suppression or to credit fire barriers that do not meet established fire resistance requirements, the applicability of these analyses under performance-based, risk-informed fire scenarios should be established by the licensee. (Reference NEI 04-02, Sections 2.3, 4.3.2, and Appendix B-2)

- iii) The methods applied in modeling of fire hazards should be described (e.g., hand calculations, zone models, computation fluid dynamics models - See NFPA 805, Appendix C, and NEI 04-02, Section 5.1.2 and Appendix D, for additional discussion). The validity of the models and acceptability of the application to the specific scenario or analysis should be reviewed against DG-1139, Position 4.2. Fire modeling methods different from those in DG-1139 may be used “at risk” and are subject to NRC review (Reference NFPA 805, Section 2.4.1.2.1).
- iv) Where the licensee has applied probabilistic safety assessment (PSA) methods in determining the performance criteria of NFPA 805, Paragraph 1.5, are satisfied, the methods and results should be described. The validity of the method and acceptability of the application to the specific scenario or analysis should be reviewed against DG-1139, Position 4.3. Methods different from those in the Draft Regulatory Guide may be used, but are subject to NRC approval (Reference NFPA 805, Section 2.4.3.3).

The observer should check PSA results and conclusions. Fire frequencies and the supporting technical basis for their determination should be reviewed. Failure probabilities of structures, systems, components, and human response elements assumed in the analysis should be reviewed to determine if the assumptions and data provide a realistic representation of the fire scenario. Changes in core damage frequency (CDF) and large early release frequency (LERF) should be used as measures of risk.

- v) Where the licensee nuclear safety capability analysis relies on circuit analysis that has not been previously approved by the NRC, or where outstanding circuit analysis issues (e.g., URI's, identified during transition, existing findings) have been identified and resolved through implementation of NFPA 805, the observer should check the analysis for acceptability. (Reference NFPA 805, Section 2.4.2.2, DG-1139, Position C.4.4, RIS 2004-03, NEI 04-02, Appendix B)
  - vi) Where the licensee relies on recovery actions to demonstrate that a nuclear safety capability success path is available to meet the applicable performance criteria, the actions should be described. The description of the recovery actions should include an evaluation of how the recovery actions satisfy the acceptance criteria promulgated for the new operator manual actions rulemaking under Appendix R, Section III.P demonstrating the actions can be accomplished prior to unrecoverable conditions that prevent accomplishment of the performance criteria. The reviewer should evaluate the reasonableness of the described actions in light of the postulated fire scenarios and related damage. Recovery actions previously approved by the staff should be documented by the licensee. (Reference NFPA 805, Sections 1.6.52, 4.2.4, and 4.2.4.1.6; NEI 04-02, Appendix B-2)
  - vii) Performance-based, risk-informed evaluations performed as part of a change evaluation (NFPA 805, Paragraphs 2.2.9 and 2.4.4) or in demonstrating the nuclear safety capability meets the performance criteria (NFPA 805, Paragraph 4.2.4.2) must address risk, defense-in-depth, and safety margin. Where quantitative risk analysis is performed, the analysis should demonstrate that the risk meets the acceptance criteria described in NFPA 805, Paragraph 2.4.4.1, and NEI 04-02, Section 5.3. Deterministic methods are "deemed to satisfy" defense-in-depth and safety margin requirements (see NFPA 805, Paragraphs 2.4.4.2 and 2.4.4.3). The observer should check the licensee's documentation to determine if risk, defense-in-depth and safety margin have been adequately addressed.
- d. Shutdown operations. NFPA 805 specifies the minimum fire protection requirements for all phases of plant operation including shutdown (NFPA 805, Paragraph 1.1). Availability of safety equipment and containment integrity can be significantly different during shutdown/refueling than during power operations. The observer should check the methods and analyses that demonstrate the performance criteria are met for fire events that may occur during shutdown conditions and that may impact the ability to maintain necessary safety functions. NEI 04-02, Section 4.3.3, provides guidance on identifying and managing the risks of shutdown operations.

The licensee documentation should be reviewed to determine if high risk evolutions (HREs) have been identified along with the key safety functions applicable to these evolutions and the SSCs associated with the key safety functions. Success paths for accomplishing the key safety functions should be identified as necessary to demonstrate the capability to meet performance criteria following a fire.

Fire areas containing the key safety function SSCs should be identified. Fire hazards (in situ and transient) in the area should be identified along with an evaluation of their potential impact on the SSCs. Fire modeling and damage assessment should be described where reliance on these types of analyses are necessary to demonstrate the performance criteria have been met.

If fire models and risk assessment methods are applied in demonstrating the safety functions are adequately protected to meet the applicable performance criteria, the observer should check these models and methods in a manner consistent with the guidelines in VII.c.iii above. The results of these check and proposed means of mitigating identified risks during HREs should be sampled for acceptability.

- e. Radiation release. The observer should check the licensee's identification of potential sources of radioactive material release and the protective measures, procedures, and response capability to prevent or limit radioactive material release associated with the direct effects of fire suppression activities. Smoke control and water run-off containment measures should be included in pre-fire planning documents and described by the licensee. (Reference NFPA 805, Paragraphs, 1.5.2 and 4.3; DG-1139, Position C.3.3; and NEI 04-02, Section 4.3.4)

#### **4. Monitoring, Documentation, Configuration Control, and Quality**

NFPA 805, Paragraph 2.6 contains the requirements for monitoring 1) the fire protection program to assess the performance of the program in meeting the performance criteria, 2) the availability and reliability of fire protection systems and features to assure that these are maintained, and 3) analytical assumptions in the engineering analyses (e.g., fire models and risk assessments) to provide assurance that the assumptions are maintained. Paragraph 2.7 contains the requirements for program documentation, configuration control, and quality. The following should be sampled:

- a. Program Maintenance. The licensee should have established processes for documenting and maintaining the fire protection program, including the fire protection design basis and the methods for monitoring the analytical assumptions in fire models, risk assessments, or other applicable engineering evaluations and analyses.
- b. Analytical Tools. Where the licensee has applied calculational tools (e.g., fire modeling software) or numerical methods, the licensee should describe the verification and validation of these analytical methods and the applicability to the specific conditions for which the methods are being applied. Where the methods are approved by the NRC, the licensee should document the specific application of the method is acceptable.

- c. Qualifications. The application of fire modeling software tools requires a solid understanding of their application, the underlying analytical methods, the assumptions, and the limitations. Use of numerical methods also requires understanding of the application and limitations of the methods. Personnel performing risk assessments should be appropriately qualified. The licensee should have a means of ensuring that qualified personnel are involved in the application of the analytical tools (e.g., fire modeling and risk assessment) used in demonstrating the capability to meet the performance criteria.
- d. Fire Protection Change Evaluation Process. NFPA 805 includes a specific provision for evaluating changes previously approved as fire protection program elements, which replaces the provisions of the standard license condition and meets the requirements of 10 CFR 50.59 (c)(4). DG-1139 outlines elements of an acceptable fire protection change evaluation process under NFPA 805. The observer should verify that licensee procedures implement a complete fire protection change evaluation process that is integrated with the licensee's overall plant change management process. (Reference NFPA 805, Paragraph 2.2.9, 2.4.4 and 2.7; DG-1139, Position C.3.1; NEI 04-02, Section 5.3)

## **VIII. OBSERVATION VISIT DOCUMENTATION**

The information, results, and experience from this observation visit will be considered in the approval of the licensee's license amendment request to adopt NFPA 805 and should also be used to update the implementation regulatory guidance, standard review plan, and/or inspection procedures, as appropriate. The sampling done during the pilot plant observation visit is intended to confirm acceptability of the licensee's fire protection program documentation, plant design, and procedures in providing sufficient and adequate information to conclude that the transition of the fire protection program to NFPA 805 meets the Observation Criteria. Reports on each observation visit will be placed in the Public Document Room.

## **IX. IMPLEMENTATION**

Except in cases in which the applicant proposes an acceptable alternative method or criteria for complying with the specified NRC regulations, the methods or criteria described herein will be used by NRC staff in their observation of conformance of the licensee's risk-informed, performance-based fire protection program with the applicable NRC regulations. This guide will be used to pilot the first few plants that submit a license amendment to adopt NFPA 805. This guide may also be used to review a nuclear power plant licensee that requests their program be reviewed in support of license amendment request that is filled after the pilot observation visits are complete.

## **X. RESOURCES**

It is currently anticipated the NRC pilot plant observation visits will require the equivalent of 1 FTE per pilot plant per year.

## **XI. REFERENCES**

- a. Title 10 Code of Federal Regulations, Part 50, Section 48 (10 CFR 50.48), “Fire protection.”
- b. Title 10 Code of Federal Regulations, Part 50, Appendix A, “General Design Criteria for Nuclear Power Plants.”
- c. Title 10 Code of Federal Regulations, Part 50, Appendix R, “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979.”
- d. Draft Regulatory Guide DG-1139, “Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants,” Draft for Comment, September 2004.
- e. National Fire Protection Association Standard, NFPA 805, “Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Stations,” 2001 Edition.
- f. Nuclear Energy Institute, NEI 04-02, “Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c),” Revision F, July 2004.
- g. Regulatory Issue Summary 2004-03, Revision 1, “Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Inspections,” December 29, 2004.
- h. Nuclear Energy Institute, NEI 00-01, Guidance for Post-Fire Safe Shutdown Analysis, Revision 1, November 2004.