

**Figure 1
FAQ TEMPLATE**

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805 TF FPWG RATF RIRWG BWROG PWROG

Subject:

Interpretation of guidance? Yes / No

Proposed new guidance not in NEI 04-02? Yes / No

Details:

NEI 04-02 guidance needing interpretation (include section, paragraph, and line numbers as applicable):

Various sections (to be completed following initial FAQ review and feedback.

Circumstances requiring guidance interpretation or new guidance:

NFPA 805 Chapter 3, *Fundamental Fire Protection Program and Design Elements*, does not provide much flexibility for interpretation and engineering judgment on a number of fire protection systems/features. The use of engineering evaluations is not specifically allowed in NFPA 805, Chapter 3, in many instances, to allow judgment of acceptability.

Additionally, there is overlap between NFPA 805 Chapters 3 and 4 regarding which requirements are in effect and potential confusion with respect to the need for NRC approval of risk-informed, performance-based evaluations.

Refer to FAQ 06-004 for more detail and clarification on the relationship between NFPA 805 Chapters 3 and 4.

Detail contentious points if licensee and NRC have not reached consensus on the facts and circumstances:

Engineering evaluations (e.g., Generic Letter 86-10 evaluations) have been an integral part of fire protection programs for over 20 years. The transition of existing engineering equivalency evaluations under the deterministic approach is part of the foundation of the “safe today, safe tomorrow” concept (See Figure 2.2, Section 2.2.7, and A2.2.7 of NFPA 805). The inability of licensees to be able to perform engineering evaluations without submitting an LAR for prior approval could pose a significant burden post transition for items that have low risk significance.

Potentially relevant existing FAQ numbers:

Refer to FAQ 06-004 for more detail and clarification on the relationship between NFPA 805 Chapters 3 and 4.

FAQ 06-011 provides clarification on the transition of alternative shutdown fire areas ‘deterministically’. FAQ 06-008 states that engineering evaluations assessing the adequacy of separation and protection of the area, room, or zone under consideration for fire areas previously considered alternative shutdown under 10 CFR 50, Appendix R Section III.G.3 would not need prior approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

Response Section:

Proposed resolution of FAQ and the basis for the proposal:

Refer to attached report, NFPA 805 – Engineering Evaluations – Transition and Alternative Methods, for background and supporting information related to this FAQ.

The purpose of the attached report is to provide:

- An alternative approach to allow performance-based engineering evaluations to be performed post-transition for fire protection features and elements addressed in NFPA 805, Chapter 3. This process should be requested as part of the transition License Amendment Request to meet the requirements outlined in 10 CFR 50.48(c)(vii) and 10 CFR 50.48(c)(4). This approach is discussed in Section 4 of the report.
- A clarification to allow transition of adequate existing engineering evaluations that address fire protection features and elements addressed in NFPA 805, Chapter 3. The approach would allow engineering evaluations that have been made in accordance with an appropriate application of the guidelines of Generic Letter 86-10, and evaluated under the requirements of 10 CFR 50.59, or the fire protection standard license condition (Fire Protection Program Regulatory Reviews), to be acceptable for transition to the new fire protection licensing basis without the need for a change evaluation or NRC review and approval. This approach is discussed in Section 5 of the report.

If appropriate, provide proposed rewording of guidance for inclusion in the next Revision:

Various sections will be updated to reflect the content of this FAQ (to be completed following initial FAQ review and approval of the concept from the NRC). It is anticipated that the main text of the attached report and Appendix C would become a new Appendix to NEI 04-02.

**Attachment to FAQ 06-0008 - NFPA 805 – Engineering Evaluations –
Transition and Alternative Methods**

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1.0 Issue

NFPA 805 Chapter 3, *Fundamental Fire Protection Program and Design Elements*, does not provide much flexibility for interpretation and engineering judgment on a number of fire protection systems/features. The use of engineering evaluations is not specifically allowed in NFPA 805, Chapter 3, in many instances, to allow judgment of acceptability.

Additionally, there is overlap between NFPA 805 Chapters 3 and 4 regarding which requirements are in effect and potential confusion with respect to the need for NRC approval of risk-informed, performance-based evaluations. Refer to FAQ 06-004 for more detail and clarification on the relationship between NFPA 805 Chapters 3 and 4.

Engineering evaluations (e.g., Generic Letter 86-10 evaluations) have been an integral part of fire protection programs for over 20 years. The transition of existing engineering evaluations under the deterministic approach is part of the foundation of the “safe today, safe tomorrow” concept (See Figure 2.2, Section 2.2.7, and A2.2.7 of NFPA 805). The inability of licensees to be able to perform engineering evaluations without submitting an LAR for prior approval could pose a significant burden post transition for items that have low risk significance.

The process outlined below will be utilized as a guide for new post-transition engineering evaluations and during the review of existing engineering evaluations (e.g., Generic Letter 86-10 evaluations) during the transition process.

2.0 Purpose

The purpose of this document is to provide:

- An alternative approach to allow performance-based engineering evaluations to be performed post-transition for fire protection features and elements addressed in NFPA 805, Chapter 3. This process should be requested as part of the transition License Amendment Request to meet the requirements outlined in 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4). This approach is discussed in Section 4.
- A clarification to allow transition of existing engineering evaluations that address fire protection features and elements addressed in NFPA 805, Chapter 3. The approach would allow engineering evaluations that have been made in accordance with an appropriate application of the current deterministic guidelines (e.g., Generic Letter 86-10), and evaluated under the requirements of 10 CFR 50.59, or the fire protection standard license condition (Fire Protection Program Regulatory Reviews), to be transitioned to the new fire protection licensing basis without the need for a change evaluation or NRC review and approval. This approach is discussed in Section 5.

Two primary options appear to be appropriate for this process to be approved and utilized consistently by plants transitioning to a new fire protection licensing basis. These options are:

- Approval of the process in this FAQ. This will result in a future revision to NEI 04-02 (along with the other FAQs), with future endorsement by the NRC in a revision to Regulatory Guide 1.205. Individual plants would refer to the standard process described in NEI 04-02 and Regulatory Guide 1.205 in their plant-specific LAR.
- Approval of this process via a Topical Report and subsequent Safety Evaluation Report. Individual plants would refer to the standard process described in Topical Report in their

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plant-specific LAR. Use of Topical Reports to support the License Amendment process is discussed in Section 2.4 of NEI 04-02, Revision 1.

3.0 Background

The following documents provide discussion on engineering evaluations with respect to NFPA 805 transition:

- NFPA 805 (2001), Section 2.2.7 and its explanatory material allow the use of existing engineering evaluations to transition as part of the ‘deterministic’ approach for meeting NFPA 805 Chapter 4 criteria. This concept is also depicted in Figure 2.2 of NFPA 805. The transition of existing engineering evaluations under the deterministic approach is part of the foundation of the “safe today, safe tomorrow” concept.
- 10 CFR 50.48(c)(2)(vii) allows the use of performance-based methods for NFPA 805 Chapter 3, Fundamental Fire Protection Program and Design Elements via the license amendment process. In addition, 10 CFR 50.48(c)(4) provides a mechanism for risk-informed or performance-based alternatives to compliance with NFPA 805 via the license amendment process.
- NEI 04-02 Revision 1, Section 4.3.1, Fundamental Fire Protection Program and Design Elements Transition Review, provides guidance on the transition of engineering evaluations that have been made in accordance with the correct application of the current deterministic guidelines (e.g., Generic Letter 86-10), and evaluated under the requirements of 10 CFR 50.59, or the fire protection standard license condition. NEI 04-02 Revision 1, Section 4.3.2, Nuclear Safety Performance Criteria Transition Review, provides similar guidance on the transition of engineering evaluations.

Section 5.3.2 of NEI 04-02, Revision 1, Defining the Change, provides guidance on how changes to NFPA 805 Chapter 3 items may be addressed. However, even with the guidance in NEI 04-02 Revision 1, there is still potential confusion over what types of engineering evaluations would require approval via the license amendment process.

- Regulatory Guide 1.205 Section 3.2 re-iterates the requirements and guidance in NFPA 805, 10 CFR 50.48(c), and NEI 04-02 regarding existing engineering evaluations. In addition, Regulatory Guide 1.205 provides guidance on ‘acceptable’ existing engineering evaluations with reference to NUREG-0800 Section 9.5.1 and Regulatory Guide 1.189. Regulatory Guide 1.205 Section 3.2.2 also re-iterates the 10 CFR 50.48(c) process for use of the license amendment process for deviations from NFPA 805 Chapter 3 and alternative change evaluation methodologies.

Refer to Appendix A for the details contained in the referenced documents.

4.0 Post Transition Engineering Evaluations

4.1 Alternative Approach – Approval Process

As part of the License Amendment Request process, permission to use methods previously allowed by the current deterministic guidance (e.g., Generic Letter 86-10 and reiterated in Regulatory Guide 1.189) should be requested. The license amendment request should request permission to use performance-based processes, in accordance with Section 2.4 of NFPA 805, to address post-transition changes to Fundamental Fire Protection Program and Design Elements in accordance with 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

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In cases where the specific requirements of NFPA 805 Chapter 3 are not met for a required system/feature, an engineering technical evaluation may be performed to determine if the condition is acceptable. Technical evaluations may be performance-based and/or deterministic evaluations.

Post-transition engineering evaluations to address cases where the specific requirements of NFPA 805, Chapter 3 are not met shall be evaluated using the Fire Protection change process. In accordance with Section 2.4.4 of NFPA 805, the change evaluation shall be performed to ensure that a change to a previously approved fire protection program element is acceptable. The change evaluation process shall consist of an integrated assessment of the acceptability of risk, defense-in-depth, and safety margins.

In accordance with 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4), this alternative process is intended to:

- (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).

4.1.1 Scope of Engineering Evaluations under Alternative Approach

Examples of engineering evaluations related to NFPA 805 Chapter 3 that are proposed under this alternative methodology include the program and design elements discussed below. However, the proposed evaluation scope is not limited to the following items, which are those that typically require 'engineering' evaluation for technical adequacy. Other fire protection program and design elements in NFPA 805 Chapter 3 are also proposed to be included under the alternative approach. In order to ensure the acceptability of any proposed evaluations, engineering evaluations that address cases where the specific requirements of NFPA 805, Chapter 3 are not met shall be evaluated using the Fire Protection change process, which shall consist of an integrated assessment of the acceptability of risk, defense-in-depth, and safety margins.

Passive Fire Protection Features [NFPA 805 Section 3.11] – Engineering evaluations will assess passive fire features for their adequacy in performing their intended function during and following a fire. This includes:

- Building Separation [NFPA 805 Section 3.11.1]
- Fire Barriers (walls, ceilings, floors) [NFPA 805 Section 3.11.2]
- Through Penetration Fire Stops [NFPA 805 Section 3.11.4]
- Electrical Raceway Fire Barrier Systems [NFPA 805, Section 3.11.5]

*Note: Section 3.11.3 of NFPA 805 has an exception that allows performance-based analysis where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries.

NFPA Code Deviations - Engineering evaluations will be allowed to demonstrate that NFPA code deviations do not adversely affect fire protection system and feature performance during and following a fire. Typical NFPA code deviation evaluations that can be performed include:

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- Water Supply (NFPA 20, 22, 24) [NFPA 805 Section 3.5]
- Standpipe and Hose Stations (NFPA 14) [NFPA 805 Section 3.6]
- Portable Extinguishers (NFPA 10) [NFPA 805 Section 3.7]
- Fire Alarm and Detection Systems (NFPA 72) [NFPA 805 Section 3.8]
- Automatic and Manual Water-Based Fire Suppression Systems (NFPA 13, 15, 750, 16) [NFPA 805 Section 3.9]
- Gaseous Fire Suppression Systems (NFPA 12, 12A, 2001) [NFPA 805 Section 3.10]

Engineering evaluations may also be performed to address NFPA code for other codes referenced in NFPA 805 Chapter 3.

4.1.2 Engineering Evaluations Not Requiring Alternative Methodology

The following types of engineering evaluations should not require use of alternative methodology under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4), since there are not specific provisions in NFPA 805 Chapter 3 for these items.

Suppression and Detection System Coverage Evaluations – Coverage of detection and suppression systems is specified in the deterministic approach of NFPA 805 section 4.2.3. If coverage is specified in an NFPA code, then the alternative methodology could be applied as described above. If coverage is not specified, then engineering evaluations could be performed using the standard approaches for evaluations without the need for prior approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

Intervening Combustibles between Redundant Trains in the Same Fire Area - Lack of intervening combustibles or fire hazards is specified in the deterministic approach of NFPA 805 section 4.2.3. There is no specific NFPA 805 Chapter 3 correlation to this protection scheme. Engineering evaluations could be performed using the standard approaches for evaluations without the need for prior approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

Alternative Shutdown Fire Area, Room, or Zone Under Consideration – Evaluations may exist that assess the adequacy of separation and protection of the area, room, or zone under consideration for fire areas previously considered alternative shutdown under 10 CFR 50, Appendix R Section III.G.3. These evaluations may transition deterministically in accordance with guidance in NEI 04-02 Appendix B.2 as part of the basis for acceptability (e.g., detection/suppression or fire barriers related to the area, room, or zone under consideration). These evaluations would typically not be in conflict with any NFPA 805 Chapter 3 requirements, and therefore, would not need prior approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

Fire Barrier Penetrations - Section 3.11.3 of NFPA 805 has an exception that allows performance-based analysis where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries. Therefore, these evaluations would not need prior approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

4.2 *Guidance for Performing Engineering Equivalency Evaluations*

Guidance for preparation and development of engineering evaluations under the alternative approach is provided in Appendix C of this document. This guidance is based upon Appendix A

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to NEI 02-03, *Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program* (June 2003). The purpose of Appendix A to NEI 02-03 is to provide guidance for the preparation and development of engineering evaluations to determine if changes resulting in a deviation(s) from applicable regulatory requirements, guidance documents, or the fire protection licensing basis are acceptable. The guidance may also be utilized to evaluate deviations from applicable NFPA codes. The guidance is consistent with the information contained in Generic Letter 86-10.

Although NEI 02-03 was developed for use under a traditional fire protection licensing basis, most of the guidance for performing engineering evaluations is directly applicable to a licensee that has transitioned to a new NFPA 805 licensing basis.

A proposed change to Appendix A to NEI 02-03 is included in Appendix C of this document. The proposed change to NEI 02-03 is as follows:

- Acceptance criteria and processes have been modified to be consistent with NFPA 805 and its guidance documents
- Interface with the risk-informed, performance-based change evaluation process was added.
- References to engineering evaluations for addressing operator manual actions (recovery actions) were removed. This is an industry issue addressed by other processes.
- References to engineering evaluations related to fire protection program or administrative control requirements were removed, since these topics are addressed by other processes.

5.0 Existing Engineering Evaluations

5.1 Transition of Existing Engineering Evaluations – Approval Process

As part of the license amendment process, it is proposed that engineering evaluations that have been made in accordance with an appropriate application of the current deterministic guidelines (e.g., Generic Letter 86-10), and evaluated under the requirements of 10 CFR 50.59, or the fire protection standard license condition (Fire Protection Program Regulatory Reviews), be considered acceptable for transition to the new fire protection licensing basis. These engineering evaluations would not be considered a “change” for the purposes of a transition change evaluation. These evaluations may be associated with fire protection systems and features addressed in NFPA 805, Chapter 3.

Acceptable uses of engineering evaluations that can be transitioned to a new licensing basis, without prior approval and without the need for a transition change evaluation include, but are not limited to:

- Fire Area Boundary Evaluations
- NFPA Code Deviations
- Suppression and Detection System Coverage Evaluations
- Electrical Raceway Fire Barrier System Evaluations
- Intervening Combustibles between Redundant Trains in the Same Fire Area
- Alternative Shutdown Fire Area, Room, or Zone Under Consideration

Refer to the table in Appendix B for a listing of engineering evaluations addressed by Generic Letter 86-10, RG 1.189, with cross references to applicable NFPA 805 sections.

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Transition of the engineering evaluations as part of the current licensing basis is not allowed under the following conditions:

- Engineering evaluations based solely on quantitative risk evaluations (PRA based calculations with decisions based solely on impact of an item/issue on core damage frequency, without consideration for fire protection regulatory requirements, licensing basis, defense-in-depth, and safety margins) do not meet the threshold for self approval and must be submitted as part of license amendment request process.
- Engineering evaluations that are judged to be of unacceptable quality.
- Inappropriate use of the engineering evaluation process (e.g., for a pre-1979 plant, judging that 15 feet of separation between redundant trains with suppression and detection meets 10 CFR 50, Appendix R, Section III.G.2.b would not be an appropriate use of an engineering evaluation).

5.2 Guidance for Transition of Existing Engineering Equivalency Evaluations

NEI 04-02 and Regulatory Guide 1.205 discuss the process for determination of acceptability of engineering evaluations. Specific details are not provided on how to make this determination.

5.2.1 NEI 02-03 Guidance

NEI 02-03, Appendix A, provides guidance for the preparation and development of engineering evaluations to determine if changes result in a deviation from applicable regulatory requirements, guidance documents, or the fire protection licensing basis are acceptable. The guidance may also be utilized to evaluate deviations from applicable NFPA codes. The guidance in NEI 02-03 is consistent with the information contained in Generic Letter 86-10. The evaluation criteria and considerations in Appendix A to NEI 02-03 should be utilized in the decision-making process regarding the adequacy of engineering evaluations for transition. These criteria and considerations should also be utilized in upgrading engineering evaluations or performing additional engineering evaluations prior to transition.

5.2.2 Engineering Equivalency Evaluations – Adequacy Determination

The following process should be used to determine if an existing engineering equivalency is adequate to transition:

- Engineering evaluation should not be based solely on quantitative risk evaluations.
- The engineering evaluation should be an appropriate use of the engineering evaluation process (e.g., for a pre-1979 plant, judging that 15 feet of separation between redundant trains with suppression and detection meets 10 CFR 50, Appendix R, Section III.G.2.b would not be an appropriate use of an engineering evaluation).
- Evaluation has been evaluated against the criteria in the pre-transition standard fire protection license condition, 10 CFR 50.59, or plant specific process used to determine the impact of the change/condition on the ability to achieve and maintain post-fire safe shutdown.
- Based upon the judgment of the reviewer, the evaluation contains an appropriate level of rigor and bases. Basic attributes include:
 - Assumptions, methods, results are clearly stated and valid (refer to discussion of NEI 02-03).

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- Evaluations reflect the current plant configuration or are clearly bounded to reflect changing plant conditions.

The results of the engineering evaluations will require judgment. The results of the transition evaluation should be formally documented as part of the transition report. This documentation should consist of a listing of each evaluation (document reference, revision no., related fire areas, etc.) and the results of the adequacy review. Existing engineering evaluations that are deemed to be necessary to support transition to the new licensing basis but are determined to be inadequate can be:

- Updated to an acceptable level before transition and transitioned over to the new licensing basis, or,
- Evaluated during the transition process as part of the change evaluation process. (Note: Depending upon the significance of the adequacy determination, the item under consideration may need to be addressed via the corrective action process and/or may require compensatory measures.)

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Appendix A – Industry Document Excerpts

A.1 NFPA 805 Section 2.2.7, Existing Engineering Equivalency Evaluations

NFPA 805 (2001), Section 2.2.7 states:

“2.2.7 Existing Engineering Equivalency Evaluations. When applying a deterministic approach, the user shall be permitted to demonstrate compliance with specific deterministic fire protection design requirements in Chapter 4 for existing configurations with an engineering equivalency evaluation. These existing engineering evaluations shall clearly demonstrate an equivalent level of fire protection compared to the deterministic requirements.”*

The explanatory material in Appendix A to NFPA 805 provides the following additional information:

“A.2.2.7 Refer to existing engineering equivalency evaluations (previously known as Generic Letter 86-10 evaluations, exemptions, deviations) performed for fire protection design variances such as fire protection system designs and fire barrier component deviations from the specific fire protection deterministic requirements.

Once NFPA 805 is adopted for a facility, future equivalency evaluations (previously known as Generic Letter 86-10 evaluations) are to be conducted using a performance-based approach. The evaluation should demonstrate that the specific plant configuration meets the performance criteria in the associated with the same fire scenario.”

A.2 NEI 04-02 Revision 1 Approach

NEI 04-02 Revision 1, Section 4.3.1, Fundamental Fire Protection Program and Design Elements Transition Review, provides guidance on the transition of engineering evaluations that have been made in accordance with the correct application of the guidelines of Generic Letter 86-10, and evaluated under the requirements of 10 CFR 50.59, or the fire protection standard license condition:

“It is important that the “previously approved alternatives” be clearly determined in order to understand the level of review and potential upgrades necessary to meet the requirements in Chapter 3 of NFPA 805. Fire protection program features and systems, although previously reviewed and approved by the NRC, may have been changed since initial NRC approval. Such changes are part of the CLB if they have been made in accordance with the correct application of the guidelines of Generic Letter 86-10, an evaluation of plant changes under the requirements of 10 CFR 50.59, or the fire protection standard license condition (NEI 02-03). The fire protection standard license condition allows changes to the “approved fire protection program without prior approval of the Commission if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.” Where the changes from the original NRC review and approval have been made appropriately using an approved change process, the changes are considered an acceptable part of the CLB. Licensees may rely on these changes to claim compliance but the NRC may inspect those changes and conclude that they do not comply with NFPA 805. However, they are not considered previously approved by the NRC for the purposes of superseding requirements in Chapter 3.”

NEI 04-02 Revision 1, Section 4.3.2, Nuclear Safety Performance Criteria Transition Review, provides similar guidance:

“Just as in the Fundamental Fire Protection Program and Design Elements review discussed in Section 4.3.1, Fire protection program features and systems, associated with a pre-transitional licensing basis, although previously reviewed and approved by the NRC, may have been changed since initial NRC approval. Such changes are part of the Licensee’s approved Fire Protection

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Program if they have been made in accordance with the correct application of the guidelines of Generic Letter 86-10, and evaluated under the requirements of 10 CFR 50.59, or the fire protection standard license condition (Fire Protection Program Regulatory Reviews). The fire protection standard license condition allows changes to the “approved fire protection program without prior approval of the Commission if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.” Where the changes from the original NRC review and approval have been made appropriately using an approved change process, the changes are considered an acceptable part of the CLB. Licensees may rely on these changes to claim compliance but the NRC may inspect those changes and conclude that they do not comply with NFPA 805. However, they are not considered previously approved by the NRC for the purposes of superseding requirements in Chapter 3 and as such should be submitted to the NRC for approval as a license amendment request.”

Additional discussion in Section 4.3.2 of NEI 04-02 clearly states that these evaluations performed appropriately under the CLB can be transitioned to the new licensing basis.

Appendix B.1 of NEI 04-02, Revision 1, Transition of Fundamental Fire Protection Program and Design Elements, states:

“Existing Generic Letter 86-10 evaluations, which evaluate deviations from NFPA 805 Chapter 3 requirements, must be submitted to the NRC for approval as a license amendment if they do not meet the License Amendment Request threshold discussed in Section 5.3.2.”

Section 5.3.2 of NEI 04-02, Revision 1, Defining the Change, provides the following:

“Additional consideration should be given to changes to Fundamental Program Elements and Minimum Design Requirements. 10 CFR 50.48(c)(2)(vii) allows licensees to use performance-based methods to demonstrate compliance with NFPA 805 Chapter 3 requirements. However, these alternate methods must be approved via the license amendment process (10 CFR 50.48(c)(4)).

Most changes to the Fundamental Program Elements and Minimum Design Requirements should not require a License Amendment request, since they are evaluations that demonstrate compliance with requirements of Chapter 3 of NFPA 805. Licensees can deviate from the NFPA standards referenced in NFPA 805 Chapter 3 without NRC approval if allowed by the code of record, so long as the evaluated condition is in accordance with the terms of the code of record (e.g., “Nothing in this standard is intended to restrict new technologies or alternate arrangements, providing the level of safety prescribed by the standard is not lowered.” – Excerpt from 1985 edition of NFPA 13) or if the code does not dictate the specific issue (e.g., adequacy of coverage of suppression and detection systems). Examples of changes that would not require a License Amendment are:

- *Replacing a fire rated component (e.g., penetration seal, door, wrap, etc.) with a different component/material having the same or greater fire rating. This does not require a license amendment because it meets the appropriate code.*
- *Changing the surveillance frequency of a fire protection feature or system based on NFPA standard as long as the underlying basis for the NFPA standard frequency is the same. This does not require a license amendment because the surveillance frequency would satisfy that specified in the current edition of NFPA codes for providing reasonable assurance that the system or component is maintained in an operable condition.*
- *Evaluating a blocked sprinkler head(s) for adequate coverage in the area. Chapter 3 of NFPA 805 and the referenced code do not dictate where a sprinkler system should be*

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installed. Therefore the adequacy of the coverage should be evaluated with respect to the nuclear safety component(s) the sprinkler system is protecting.

- *Evaluating a broken/missing hanger on a fire suppression system. The acceptability of this deviation can be evaluated to show that the support of the system is still adequate with the broken/missing hanger and is therefore equivalent to a code compliant system as allowed by the code of record.*
- *Conversely, examples of changes that would require a License Amendment are:*
- *Revision of concentration of an agent to a value less than that required by the respective code or previously approved value.*
- *Reducing the number of fire brigade members required on-site to below five.*
- *Elimination of the Fire Prevention Program at the plant”*

A.3 10 CFR 50.48(c) – Alternative Methods Requirements

10 CFR 50.48(c)(2)(vii) states:

“vii) Performance-based methods. Notwithstanding the prohibition in Section 3.1 against the use of performance-based methods, the fire protection program elements and minimum design requirements of Chapter 3 may be subject to the performance-based methods permitted elsewhere in the standard. Licensees who wish to use performance-based methods for these fire protection program elements and minimum design requirements shall submit a request in the form of an application for license amendment under § 50.90. 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;”

10 CFR 50.48(c)(4) states:

“(4) Risk-informed or performance-based alternatives to compliance with NFPA 805. A licensee may submit a request to use risk-informed or performance-based alternatives to compliance with NFPA 805. The request must be in the form of an application for license amendment under § 50.90 of this chapter. 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).”*

A.4 Regulatory Guide 1.205

A.4.1 Regulatory Guide 1.205, Existing Engineering Equivalency Evaluations

Section 2.3, Existing Engineering Equivalency Evaluations, of Regulatory Guide 1.205 states:

“Section 2.2.7 of NFPA 805 describes the application of existing engineering equivalency evaluations (EEEEEs) when using a deterministic approach during the transition to an NFPA 805 FPP. One type of EEEEE, commonly referred to as a “Generic Letter 86-10 (GL 86-10) evaluation,” allows licensees who have adopted the standard

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fire protection license condition (under their current FPP and in accordance with GL 86-10) to make changes to the approved FPP without prior NRC approval if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. With the exception of evaluations of certain recovery actions and any deviations from NFPA 805 requirements, a GL 86-10 evaluation showing no adverse effect on safe shutdown and permitted under the licensee’s current licensing basis is one acceptable means of meeting the NFPA 805 EEEE acceptance criterion of “an equivalent level of fire protection compared to the deterministic requirements.” However, EEEEs performed prior to transitioning to a performance-based FPP must be based on deterministic methods. If based on a risk calculation, the EEEE will have to be evaluated using the licensee’s approved NFPA 805 change evaluation process.

Operator manual actions credited for protection of redundant trains, in lieu of Appendix R III.G.2 protection, do not meet the deterministic requirements in Chapter 4 of NFPA 805. Consequently, unless specifically approved by the NRC, these operator manual actions should be addressed as plant changes in accordance with Section 2.4.4 of NFPA 805 using performance-based methods. The change process must include an evaluation of the risk impact associated with the operator manual action (either qualitative or quantitative), as appropriate. Quantitative risk calculations should be in accordance with Section 4.2.4.2 of NFPA 805 (a bounding calculation approach is acceptable). Recovery actions (NFPA 805 terminology for operator manual actions and repairs) that meet the required performance criteria of NFPA 805 and the criteria in this regulatory guide for making changes without prior NRC review and approval do not need to be submitted to the NRC for approval.

NEI 04-02, Section 4.1.1, “Transition Process Overview,” notes that the licensee will review EEEEs during the transition process to ensure the quality level and basis for acceptability are still valid. Except as noted above, satisfactory results from this review will provide adequate basis to transition EEEEs as meeting the deterministic requirements of Chapter 4 of NFPA 805. Guidance for acceptable EEEEs is provided in NUREG-0800, Section 9.5.1, “Fire Protection,” and in Regulatory Guide 1.189, “Fire Protection for Operating Nuclear Power Plants.”

EEEEs that support deviations from the requirements and methods of NFPA 805 must be submitted for NRC approval in accordance with 10 CFR 50.48(c) and NFPA 805. Regulatory Position 3.2.4 also provides specific guidance regarding submittal requirements. Of the EEEEs that must be approved by the NRC, those that are preexisting and those performed during the transition to an NFPA 805 licensing basis should be submitted with the fire protection license amendment request.

A.4.2 Regulatory Guide 1.205 Deviations from NFPA 805 Chapter 3 Requirements and Alternative Change Evaluation Methodologies

The following guidance is provided in Regulatory Guide 1.205 (May 2006), Section 3.2.2, for the use of alternative risk-informed, performance-based processes:

“10 CFR 50.48(c)(2)(vii) allows a licensee to request NRC approval (by license amendment) of the use of NFPA 805 performance-based methods in determining the licensee’s compliance with the fire protection program elements and minimum design

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requirements in Chapter 3 of NFPA 805. 10 CFR 50.48(c)(4) allows a licensee to request NRC approval (by license amendment) of the use of alternative risk-informed or performance-based methods (i.e., methods that differ from those prescribed by NFPA 805, to demonstrate compliance with 10 CFR 50.48(c).

Performance-based methods, including proposed alternative methods, applied to the licensee's FPP, including evaluation of changes to the program, must ensure the following:

- (a) The required NFPA 805 performance goals, performance objectives, and performance criteria are satisfied.*
- (b) Safety margins are maintained.*
- (c) Fire protection defense-in-depth is maintained.*

Alternative risk-informed, performance-based methods should be described in a license amendment request and must be approved by the NRC prior to incorporation in the licensee's FPP. In addition to the guidance in NEI 04-02, Section 2.4, the license amendment request should include, as a minimum, the following:

- (a) detailed description of the alternative risk-informed, performance-based method*
- (b) description of how the method will be applied, the aspects of the FPP to which it will be applied, and the circumstances under which it will be applied*
- (c) acceptance criteria, including risk increase acceptance criteria, that the licensee will apply when determining whether the results of an evaluation that uses this methodology meet the required NFPA 805 performance goals, performance objectives, and performance criteria*
- (d) for PSA-based methodologies, an explanation of how the PSA is of sufficient technical adequacy for evaluation of the changes to which it will be applied*
- (e) for PSA-based methodologies, a description of the peer review and how the review findings have been addressed*

The license amendment request should include complete and concise details of the proposed methodology to minimize the potential for misinterpretations. Where the alternative methods have been adequately described in the license amendment request and have been accepted by the NRC in an SER, these methods may be applied to the licensee's FPP. A licensee may apply these approved methods within the limits specifically described in the licensing basis to implement plant changes that affect the FPP without prior NRC review and approval.

The types of plant changes that may be approved without prior review and approval will be limited to those for which the risk assessment methods are adequate to demonstrate that any increase in risk will be below the appropriate thresholds. In addition, subsequent changes to the approved alternative methodology must be submitted for NRC review and approval (via a license amendment request) prior to being applied to the licensee's FPP."

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Appendix B – Types of Engineering Evaluations/References

Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
Fire Area Boundaries	3.11.1 Building Separation 3.11.2 Fire Barriers 3.11.3 Fire Barrier Penetrations 3.11.4 Through Penetration Fire Stops 3.11.4 Through Penetration Fire Stops	Encl 1, Item 4 Encl. 2, Questions 3.1.1, 3.1.2	4.1.2.1, App. A (A-2)	<p>GL 86-10, Enclosure 1</p> <p>4. GL 86-10 - Fire Area Boundaries</p> <p>The term "fire area" as used in Appendix R means an area sufficiently bounded to withstand the hazards associated with the area and, as necessary, to protect important equipment within the area from a fire outside the area. In order to meet the regulation, fire area boundaries need not be completely sealed floor-to-ceiling, wall-to-wall boundaries. However, all unsealed openings should be identified and considered the evaluating the effectiveness of the overall barrier. Where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries, licensees must perform an evaluation to assess the adequacy of fire boundaries in their plants to determine if the boundaries will withstand the hazards associated with the area. This analysis must be performed by at least a fire protection engineer and, if required, a systems engineer. Although not required, licensees may submit their evaluations for staff review and concurrence. However, if certain cable penetrations were identified as open SER items at the time Appendix R became effective, Section III.M of the rule applies (see 10 CFR 50.48(b)), and any variation from the requirements of Section III.M requires an exemption. In any event, these analyses must be retained by the licensees for subsequent NRC audits.</p>
Structural Fire Barriers	3.11.2 Fire Barriers 3.11.3 Fire Barrier Penetrations	Encl. 2, Questions 3.2.2 (implies ERFBS)	4.2.1	<p>RG 1.189</p> <p>4.2.1 Structural Fire Barriers</p> <p>Fire barriers are those components of construction (walls, floors, and their supports), including beams, joists, columns, penetration seals or closures, fire doors, and fire dampers that are rated by approving laboratories in hours of resistance to fire and are used to prevent the spread of fire. Where exact replication of a tested configuration cannot be achieved, the field installation should meet all of the following criteria.</p> <ol style="list-style-type: none"> a. The continuity of the fire barrier material is maintained; b. The thickness of the barrier is maintained; c. The nature of the support assembly is unchanged from the tested configuration; d. The application or "end use" of the fire barrier is unchanged from the tested configuration; e. The configuration has been reviewed by a qualified fire protection engineer and found to provide an equivalent level of protection. <p>See Regulatory Position 4.1.2 for additional guidance on the design of fire barriers relative to compartmentation and separation of equipment. 4.2.1.1 Wall, Floor, and Ceiling Assemblies. Wall, floor, and ceiling construction should be noncombustible (see Regulatory Position 4.1.1). NFPA 221, "Standard for Fire Walls and Fire Barrier Walls," can be used as guidance for construction of fire barrier walls. Materials of construction for walls, floors, and ceilings serving as fire barriers should be rated by approving laboratories in hours of resistance to fire. Building design should ensure that openings through fire barriers are properly protected. Openings through fire barriers that separate fire areas should be sealed or closed to provide a fire resistance rating at least equal to that required of the barrier itself. The construction and installation techniques for penetrations through fire barriers should be qualified by fire endurance tests (see Regulatory Position 4.2.1.5, Testing and Qualification).</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
Fire Doors	3.11.3 Fire Barrier Penetrations	Encl. 2, Questions 3.2.3	4.2.2	<p>GL 86 Enclosure 2</p> <p>3.2.3 Fire Door Modifications</p> <p>QUESTION Where labeled and rated fire doors have been modified to incorporate security hardware or for flooding protection, is an exemption from Appendix R required?</p> <p>RESPONSE Where a door is part of a fire area boundary, and the modification does not effect the fire rating (for example, installation of security "contacts"), no further analysis need be performed. If the modifications could reduce the fire rating (for example, installation a vision panel), the fire rating of the door should be reassessed to ensure that it continues to provide adequate margin considering the fire loading on both sides. Since this reassessment pertains to the establishment of a valid fire area boundary, an exemption is not required. See Section #4 of the "Interpretations of Appendix R."</p>
ERFBS	3.11.5	Encl. 2, Questions 3.2.2	N/A	<p>GL 86-10 Enclosure 2</p> <p>3.2.2 Deviations from Tested Configurations</p> <p>QUESTION</p> <p>Due to obstructions and supports, it is often impossible to achieve exact duplication of the specific tested configuration of the one-hour fire barriers which are to be placed around either conduits or cable trays. For each specific instance where exact replication of a previously tested configuration is not and cannot be achieved, is an exemption necessary in order to avoid a citation for a violation?</p> <p>RESPONSE</p> <p>No. Where exact replication of a tested configuration cannot be achieved, the field installation should meet all of the following criteria:</p> <p>The continuity of the fire barrier material is maintained.</p> <p>The thickness of the barrier is maintained.</p> <p>The nature of the support assembly is unchanged from the tested configuration.</p> <p>The application or "end use" of the fire barrier is unchanged from the tested configuration. For example, the use of a cable tray barrier to protect a cable tray which differs in configuration from those that were tested would be acceptable. However, the use of structural steel fire proofing to protect a cable tray assembly may not be acceptable.</p> <p>The configuration has been reviewed by a qualified fire protection engineer and found to provide an equivalent level of protection.</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
ERFBS	3.11.5	Encl. 2, Questions 3.3.4	4.3.2	<p>GL 86-10 Enclosure 2</p> <p>3.3.4 Cable Tray Support Protection</p> <p>QUESTION Should cable tray supports be protected if there is a sprinkler system in the fire area? Under what conditions may cable tray supports be unprotected? Do unprotected supports require an exemption?</p> <p>RESPONSE In general, cable tray supports should be protected, regardless of whether there is a sprinkler system. However, they need not be protected if (1) the qualification tests were performed on wrapped cable trays with unprotected supports, and the supports are shown to be adequate, or (2) an analysis is performed, which takes into account the fire loading and automatic suppression available in the area, and which demonstrates that the unprotected support(s) will not fail and cause a loss of the cable tray fire barrier required for the postulated fire. An exemption is not required; however, the qualification tests and applicability or the structural evaluation should be documented and available for audit.</p>
ASD Fire Area, Room, Zone	Not specifically addressed	Encl 1, Item 6	5.6.1	<p>GL 86-10 Enclosure 2</p> <p>6. Alternative or Dedicated Shutdown Section III.G.3 of Appendix R provides for "alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration." While "independence" is clearly achieved where alternative shutdown equipment is outside the fire area under consideration. This is not intended to imply that alternative shutdown equipment in the same fire area but independent of the room or the zone cannot result in compliance with the regulation. The "room" concept must be justified by a detailed fire hazards analysis that demonstrates a single fire will not disable both normal shutdown equipment and the alternative shutdown capability.</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
ASD Fire Area, Room, Zone	Not specifically addressed	Encl 2, Question 3.1.5	5.6.1	<p>GL 86-10 Enclosure 2</p> <p>3.1.5 Fire Zones</p> <p>QUESTION Appendix R, Section III.G.3 states "alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area room or zone under consideration..." What is the implied utilization of a room or zone concept under Section III.G of Appendix R? The use of the phraseology "area, room or zone under consideration" is used again at the end of the Section III.G.3. Does the requirement for detection and fixed suppression indicate that the requirement can be limited to a fire zone rather than throughout a fire area? Under what conditions and with what caveats can the fire zone concept be utilized in demonstrating conformance to Appendix R?</p> <p>RESPONSE Section III.G was written after NRC's multi-discipline review teams had visited all operating power plants. From these audits, the NRC recognized that it is not practical and may be impossible to subdivide some portions of an operating plant into fire areas. In addition, the NRC recognized that in some cases where fire areas are designated, it may not be possible to provide alternate shutdown capability independent of the fire area and, therefore, would have to be evaluated on the basis of fire zones within the fire area. The NRC also recognized that because some licensees had not yet performed a safe shutdown analysis, these analyses may identify new unique configurations.</p> <p>To cover the large variation of possible configurations, the requirements of Section III.G were presented in three Parts:</p> <p>Section III.G.1 requires one train of hot shutdown systems be free of fire damage and damage to cold shutdown systems be limited.</p> <p>Section III.G.2 provides certain separation, suppression and detection requirements within fire areas; where such requirements are met, analysis is not necessary.</p> <p>Section III.G.3 requires alternative dedicated shutdown capability for configurations that do not satisfy the requirements of III.G.2 or where fire suppressants released as a result of fire fighting, rupture of the system or inadvertent operation of the system may damage redundant equipment. If alternate shutdown is provided on the basis of rooms or zones, the provision of fire detection and fixed suppression is only required in the room or zone under consideration.</p> <p>Section III.G recognizes that the need for alternate or dedicated shutdown capability may have to be considered on the basis of a fire area, a room or a fire zone. The alternative or dedicated capability should be independent of the fire area where it is possible to do so (See Supplementary Information for the final rule Section III.G). When fire areas are not designated or where it is not possible to have the alternative or dedicated capability independent of the fire area, careful consideration must be given to the selection and location of the alternative or dedicated shutdown capability to assure that the performance requirement set forth in Section III.G.1 is met. Where alternate or dedicated shutdown is provided for a room or zone, the capability must be physically and electrically independent of that room or zone. The vulnerability of the equipment and personnel required at the location of the alternative or dedicated shutdown capability to the environments produced at that location as a result of the fire or fire suppressant's must be evaluated. These environments may be due to the hot layer, smoke, drifting suppressants, common ventilation systems, and common drain systems or flooding. In addition, other interactions between the locations may be possible in unique configurations.</p> <p>If alternate shutdown is provided on the basis of rooms or zones, the provision of fire detection and fixed suppression is only required in the room or zone under consideration. Compliance with Section III.G.2 cannot be based on rooms or zones. See also Sections #5 and #6 of the "Interpretations of Appendix R."</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
<p>Coverage of Detection and Suppression Systems</p>	<p>No specific reference to coverage in NFPA 805 Ch. 3</p> <p>Detection and suppression coverage "throughout the fire area" is specified in the deterministic approach in NFPA 805 Section 4.2.3</p>	<p>Encl 1, Item 5</p>	<p>3.1, App. A (A-3)</p>	<p>GL 86-10 Enclosure 1</p> <p>5. Automatic Detection and Suppression Sections III.G.2.b and III.G.2.c of Appendix R state that "In addition, fire detectors and automatic fire suppression system shall be installed in the fire area..." Other provisions of Appendix R also use the phrase "fire detectors and an automatic fire suppression system in the fire area..." (see e.g., Section III.G.2.e).</p> <p>In order to comply with these provisions, suppression and detection sufficient to protect against the hazards of the area must be installed. In this regard, detection and suppression providing less than full area coverage may be adequate to comply with the regulation. Where full area suppression and detection is not installed, licensees must perform an evaluation to assess the adequacy of partial suppression and detection to protect against the hazards in the area. The evaluation must be performed by a fire protection engineer and, if required, a systems engineer. Although not required, licensees may submit their evaluations to the staff for review and concurrence. In any event, the evaluations must be retained for subsequent NRC audits. Where a licensee is providing no suppression or detection, and exemption must be requested.</p>
<p>Coverage of Detection and Suppression Systems</p>	<p>No specific reference to coverage in NFPA 805 Ch. 3</p> <p>Detection and suppression coverage "throughout the fire area" is specified in the deterministic approach in NFPA 805 Section 4.2.3</p>	<p>Encl. 2, Question 3.4.2</p>	<p>3.1, App. A (A-3)</p>	<p>GL 86-10 Enclosure 2</p> <p>3.4.2 NRC Consultation</p> <p>QUESTION Section 4.1.2 of NFPA-STD-13 allows for "partial installations" or partial coverage. The standard states that "the authority having jurisdiction shall be consulted in each case." With the NRC as authority in this instance, must consultation occur only through the exemption process?</p> <p>RESPONSE No. The staff is always available to consult with utility representatives and provide guidance as to the acceptability of a particular fire protection configuration in individual plant areas. See also Section #5 of the "Interpretations of Appendix R."</p>
<p>Coverage of Detection and Suppression Systems</p>	<p>No specific reference to coverage in NFPA 805 Ch. 3</p> <p>Detection and suppression coverage "throughout the fire area" is specified in the deterministic approach in NFPA 805 Section 4.2.3</p>	<p>Encl. 2, Question 3.4.3</p>	<p>App. A (A-3)</p>	<p>GL 86-10 Enclosure 2</p> <p>3.4.3 Sprinkler Location</p> <p>QUESTION How does a suppression system designer know whether the term "throughout the area" means that sprinkler heads must be above or below cable trays when, in his judgment, the hazard of concern is a floor based fire?</p> <p>RESPONSE Section C.6.c(3) of BTP CMEB 9.5-1 states: "(3) Fixed water extinguishing systems should conform to requirements of appropriate standards such as NFPA-13, "Standard for the Installation of Sprinkler Systems," and NFPA-15, "Standard for Water Spray Fixed Systems". This question pertains to those sprinkler systems covered by NFPA-13. Chapter 4 of NFPA-13 provides guidance as to the location of sprinkler heads in relation to common obstructions. In general, to achieve complete area wide coverage, sprinklers should be located at the ceiling, with additional sprinklers provided below significant obstructions such as wide HVAC ducts and "shielded" or solid bottom stacked cable trays. To the extent that an existing or proposed sprinkler system design deviates from this concept, the design would have to be justified by a fire hazards analysis. See also Section #5 of the "Interpretations of Appendix R."</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
Coverage of Detection and Suppression Systems	No specific reference to coverage in NFPA 805 Ch. 3 Detection and suppression coverage "throughout the fire area" is specified in the deterministic approach in NFPA 805 Section 4.2.3	Encl. 2, Question 3.4.4	App. A (A-3)	<p>GL 86-10 Enclosure 2</p> <p>3.4.4 Fixed Suppression System In Fire Area</p> <p>QUESTION Are fixed suppression systems required by Section III G.3 to be throughout the fire area, room or zone under consideration?</p> <p>RESPONSE No, but partial coverage must be properly justified and documented. See Item #5 of the "Interpretations of Appendix R." "...suppression less than full area coverage may be adequate to comply with the regulation. Where full area suppression and detection is not installed, licensees must perform an evaluation to assess the adequacy and necessity of partial suppression and detection in an area. The evaluation must be performed by a fire protection engineer and, if required, a systems engineer. Although not required, licensees may submit their evaluations to the staff for review and concurrence. In any event, the evaluations must be retained for subsequent NRC audits..."</p>
Intervening Combustibles between Redundant Trains	4.2.3.3.(b), 4.2.3.4(a)	Encl. 2, Questions 3.6.1		<p>3.6.1 Negligible Quantities of Intervening Combustibles</p> <p>QUESTION Twenty feet of separation with absolutely no intervening combustibles is a rare case in most nuclear plants. What is the most acceptable method of addressing intervening combustibles? How are various utilities addressing this subject, and what would be sufficient justification to support an exemption request?</p> <p>RESPONSE If more than negligible quantities of combustible materials (such as isolated cable runs) exist between redundant shutdown divisions, an exemption request should be filed. [Negligible quantity" is an admittedly judgmental criterion, and this judgment should be made by a qualified fire protection engineer and documented for later NRC audit.] Justifications for such exemptions have been based on the following factors:</p> <ol style="list-style-type: none"> 1. A relatively large horizontal spatial separation between redundant divisions; all cables qualified to IEEE-383. 2. The presence of an automatic fire suppression system over the intervening combustible (such as a cable tray fire suppression system); 3. The presence of fire stops to inhibit fire propagation in intervening cable trays; 4. The likely fire propagation direction of burning intervening combustibles in relation to the location of the vulnerable shutdown division; 5. The availability of compensating active and passive fire protection. Any future changes in the cable configuration due to modifications could be handled under 50.59. See the provisions of the license condition in the response to question 8.2.

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
Intervening Combustibles between Redundant Trains	4.2.3.3.(b), 4.2.3.4(a)	Encl. 2, Question 3.6.2		<p>GL 86-10 Enclosure 2</p> <p>3.6.2 In-Situ Exposed Combustibles</p> <p>QUESTIONS Within Appendix R, Section III.G.2.b, the phrase "twenty feet with no intervening combustible or fire hazards" is utilized. What is the definition of "no intervening combustible?" Is the regulation focused predominantly on the absence of fixed combustibles?</p> <p>RESPONSE There is no specific definition of "no intervening combustible." The regulation is focused on the absence of in-situ exposed combustibles. Non combustible materials would not be considered as "Noncombustible Material a. A material which 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. b. Material having a structural base of noncombustible material, as defined in a., above, with a surfacing not over 1/8-inch thick that has a flame spread rating not higher than 50 when measured using ASTM E-84 Test "Surface Burning Characteristics of Building Materials." In Generic Letter 83-33, we state: "Staff Position: Section III.G.2.b requires the "separation ...with no intervening combustibles ..." To meet this requirement, plastic jackets and insulation of grouped electrical cables, including those which are coated, should be considered as intervening combustibles." For fire protection, "no intervening combustibles" means that there is no significant quantities of in-situ materials which will ignite and burn located between redundant shutdown systems. The amount of such combustibles that has significance is a judgmental decision. As with other issues, if the licensee's fire protection engineer is concerned that the quantity of combustibles between shutdown divisions may not be considered insignificant by an independent reviewer, an exemption could be requested or the staff consulted. Transient materials are not considered as an intervening combustible; however, they must be considered as part of the overall fire hazard within an area. Cables that are in cable trays which are either open or fully enclosed should also be considered as intervening combustibles. Cables coated with a fire retardant material are also considered as intervening combustibles. However, cables coated with a fire retardant material, or cables in cable trays having solid sheet metal bottom, sides and top, if protected by automatic fire detection and suppression systems and if the design is supported by a fire hazards analysis, have been found acceptable under the exemption process.</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
NFPA Code Deviations	Various	Encl. 2, Questions 3.8.1, 8.9	1.87	<p>GL 86-10 Enclosure 2</p> <p>3.8.1 Fire Protection Features NFPA Conformance</p> <p>QUESTION</p> <p>Should the fire protection features required by Section III.G conform to the NFPA Codes?</p> <p>RESPONSE</p> <p>Yes. For example, Section III G.2 requires an automatic suppression system. Our guidelines would recommend that the systems be in accordance with an NFPA Code. If deviations are made from the Code, they should be identified in the FSAR or FHA.</p> <p>8.9 NFPA Code Deviation</p> <p>QUESTION</p> <p>Is an exemption/deviation required for deviations from NFPA Codes?</p> <p>RESPONSE</p> <p>Deviations from the codes should be identified and justified in the FSAR or FHA. An exemption is not required for NFPA codes. NRC guidelines reference certain NFPA codes as guidelines to the systems acceptable to the staff, and therefore such codes may be accorded the same status as Regulatory Guides.</p> <p>When the applicant/licensee states that its design "meets the NFPA codes" or, "meets the Intent of the NFPA Codes" and does not identify any deviations from such codes, NRR and the Regions expect that the design conforms to the code and the design is subject to inspection against the NFPA codes.</p>

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Topic	NFPA 805 Section	GL 86-10 Reference	RG 1.189 Reference	Reference Information
NFPA Code Deviations	Various	Encl. 2, Questions 3.8.1, 8.9	1.87	<p>RG 1.189</p> <p>1.8.7 NFPA Code and Standard Deviation Evaluations</p> <p>For those fire protection structures, systems, and components installed to satisfy NRC requirements designed to NFPA codes and standards, the code edition in force at the time of the design and installation is the code of record to which the design is evaluated. Deviations from the codes should be identified and justified in the FSAR or FHA. Deviations should not degrade the performance of fire protection systems or features. The code of record is determined by the licensee.</p> <p>A licensee may apply the equivalency concept in meeting the provisions of the NFPA codes and standards. Nothing in the NFPA codes or standards is intended to prevent the use of methods, systems, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety as alternatives to those prescribed by the codes or standards, provided technical documentation demonstrates equivalency and the method, system, or device is listed or approved for the intended purpose.</p> <p>An exemption is not required for deviation from NFPA codes. NRC guidelines reference certain NFPA codes as providing guidance acceptable to the staff, and therefore such codes may be accorded the same status as regulatory guides.</p> <p>When the applicant/licensee states that its design "meets the NFPA code(s)" or "meets the intent of the NFPA code(s)" and does not identify any deviations from such codes, the NRC expects that the design conforms to the codes and the design is subject to inspection against the NFPA codes.</p> <p>The "Authority Having Jurisdiction" as described in NFPA documents refers to the Director, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, or designee, consistent with the authority specified in 10 CFR 1.43. The guidance in Regulatory Position 1.8.7 is based on GL 86-10.</p>

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Appendix C – Guidance for Performing Engineering Evaluations

1.0 PURPOSE

This appendix provides guidance for the preparation and development of engineering evaluations to determine if changes resulting in a deviation(s) from applicable regulatory requirements, guidance documents, or the fire protection licensing basis are acceptable. The guidance may also be utilized to evaluate deviations from applicable NFPA codes. The guidance is consistent with the information contained in Generic Letter 86-10, Implementation of Fire Protection Requirements.

This guidance is intended for licensees who have transitioned to a new fire protection licensing basis under NFPA 805. This guidance is intended to support use of alternative approaches for use of performance-based methods for addressing NFPA 805 Chapter 3 items under a license amendment in accordance with 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4). This guidance, however, may also be used to perform engineering evaluations that do not require prior NRC approval under a license amendment.

This guidance is based upon NEI 02-03, *Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program*, Revision 0 (June 2003).

2.0 SCOPE

The guidance provided in this document may be used to analyze configurations associated with deviations from the approved fire protection program, including the fire protection and nuclear safety capability systems, components, and strategies; administrative requirements and technical controls; organization; and other plant features associated with the program. Examples include, but are not limited to, the following:

2.1 Adequacy of Separation of Redundant Systems/Components Required for Post Fire Nuclear Safety Capability

- A. Fire area, zone or room boundaries that (1) are not completely sealed floor-to-ceiling or wall-to-wall by fire-rated construction, or (2) have fire rated construction/components for which the fire rating is less than that required by the regulation or the approved fire protection program. Where fire boundaries are not wall-to-wall or floor-to-ceiling with all penetrations sealed to the required fire rating, the evaluation should assess the adequacy of the boundaries to determine if they will withstand the hazards associated with the area and protect important equipment from a fire outside the area. (Reference GL 86-10, Enclosure 1, Item 4 and Questions 3.1.1 and 3.1.2)
- B. Passive fire-rated components (i.e., penetration seals, fire wraps, structural steel fire proofing, etc.) that deviate from the design and/or tested configuration, including test acceptance criteria. (Reference GL 86-10 Questions 3.2.1, 3.2.2, and 3.3)
- C. Active fire-rated components (i.e., doors, dampers, etc.) that deviate from the design and/or tested configuration. (Reference GL 86-10, Question 3.2.3)
- D. The adequacy of the separation provided between normal shutdown equipment and alternative shutdown capability located within the same

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area (Reference GL 86-10, Enclosure 1, Item 6). *Note: This would only be applicable for a alternative shutdown fire area transitioned under a deterministic approach. Performing this type of evaluation does not specifically require prior NRC approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).*

- E. The significance of combustible materials present (i.e., intervening combustibles) located between redundant nuclear safety capability success paths that are not separated by rated fire barriers (i.e., spatial separation). (Reference GL 86-10 Questions 3.6.1, 3.6.2, and 3.6.3). *Note: Performing this evaluation does not specifically require prior NRC approval under 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).*
- 2.2 The adequacy of suppression and detection systems, including partial coverage protecting nuclear safety capability cables and equipment and other required circuits of redundant success paths. (Reference GL 86-10, Enclosure 1, Item 5, and Questions 3.4.2, 3.4.3, and 3.4.4)
- 2.3 Deviations from applicable NFPA codes and standards. (Reference GL 86-10 Questions 3.8.1, 8.9)

3 LIMITATIONS

- 3.1 The process for preparing technical evaluations should be performed in accordance with the licensee's engineering calculation program (or similar program).
- 3.2 A fire protection engineer should perform or review the technical evaluation. In addition, if determined necessary by the fire protection engineer, a systems engineer should assist with the evaluation. (Reference GL 86-10, Enclosure 1, Item 4). The general qualifications for a fire protection engineer are described in Generic Letter 82-21. NEI 04-02 provides additional guidance on the qualifications for individuals practicing fire modeling and quantitative fire protection risk assessments.
- 3.3 Technical evaluations must be available for NRC review during audits or inspections (Reference GL 86-10, Enclosure 1, Items 4 and 5, NFPA 805 Section 2.7).

4.0 DEFINITIONS

Free of Fire Damage

The structure, system, or component under consideration is capable of performing its intended function during and after the postulated fire, as needed.

(Reference NFPA 805, Section 1.6.29)

5.0 EVALUATION CRITERIA AND CONSIDERATIONS

5.1 Acceptance Criteria

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- 5.1.1 Although the level of detail and analysis will vary based upon the nature and complexity of the item under evaluation, the following conditions must be assessed and documented as part of alternative approach allowed by 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4):
- (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).
- 5.1.2 The goals for nuclear safety and radioactive release, from section 1.3 of NFPA 805, are as follows:
- Nuclear Safety Goal. 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.
 - Radioactive Release Goal. 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.
- The performance objectives and performance criteria for nuclear safety and radioactive release are contained in Sections 1.4 and 1.5 of NFPA 805.
- 5.1.3 If the engineering evaluation is associated with a change, the change will be evaluated and processed using the risk-informed, performance-based change process outlined in Section 5.3 and Appendices I and J of NEI 04-02, as clarified by Regulatory Guide 1.205. The acceptance criteria in NEI 04-02, as clarified in Regulatory Guide 1.205, will apply to all applicable changes, including those discussed in this guidance document.

5.2 General Methodology

When fire protection features are evaluated, the postulated fire for the area, zone, or room affected by the change should be considered, and the overall protection scheme should be kept in perspective. The defense-in-depth principles of the fire protection program provide an adequate balance between the different features. Strengthening any one can compensate for weaknesses in others.

5.3 Adequacy of Separation of Redundant Systems/Components Required for Nuclear Safety Capability

When evaluating the adequacy of a fire barrier, the fire areas, zones, or rooms on each side of the barrier are to be individually analyzed for the impact of a fire on either side of the barrier on the redundant nuclear safety capability, including the likely spread of fire. The effectiveness of the barrier should be evaluated to demonstrate the adequacy of a barrier commensurate with the fire hazards in the area such that the barrier provides a level of protection equivalent to that provided by the deterministic requirements. A specific description of the fire protection features in the areas, zones, or rooms being

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analyzed is required to justify the change. Low fire loading alone is not a sufficient basis for the evaluation. If it is determined that each fire barrier of concern is capable of protecting the nuclear safety equipment/cables protected by the barrier (i.e., within and/or adjacent to the opposite side of the barrier), the analysis and justification for the acceptability of the fire barrier shall be documented.

In performing the engineering evaluation each of the components of fire damage mitigation described below may be considered either individually or in aggregate. For example, a passive barrier can be evaluated as an acceptable separation barrier based on its own details of construction, (e.g., 18 inch thick reinforced concrete wall with only a few open penetrations), limited in-situ combustibles in the vicinity of any open penetrations and installed automatic fire suppression and detection on the side of the barrier with the combustible materials in the vicinity of the open penetration. Whenever suppression and/or detection is credited as a part of the engineering evaluation, the effectiveness of the suppression and/or detection in terms of coverage and code compliance should be evaluated as necessary using the processes outlined in Sections 5.4 and 5.5 below.

Additionally, provisions should be made for controlling and compensating for any of the components credited in the engineering evaluation. For example, if low in-situ combustibles are credited as a component of the engineering evaluation, provisions should be included in combustible control program to limit in-situ combustibles to a level that is consistent with the engineering evaluation. Similarly, if automatic suppression is credited, provisions should be included in the plant administrative control process to properly compensate for the lack of the suppression system when it is taken out of service or determined to be inoperable.

- 5.3.1 If evaluating passive fire-rated components, the evaluation should determine, as a minimum, that:
- The temperature on the unexposed side of the barrier is sufficiently below the ignition temperature of the penetrating items.
 - The continuity and thickness of the fire barrier material is maintained.
 - The nature of the support assembly is equivalent to the tested configuration.
 - The application or "end use" of the fire barrier is unchanged from the tested configuration. For example, the use of structural steel fire proofing to protect a cable tray assembly may not be acceptable.
- 5.3.2 If evaluating active fire rated components, then the evaluation should determine if the component provides an adequate level of separation considering a fire on both sides.
- 5.3.3 If evaluating the significance of combustible materials (e.g., type, quantity, distribution, etc.) located between redundant success paths that are not separated by rated fire barriers (i.e., intervening combustibles), then the evaluation should consider the following factors to determine whether circuits or components, including other required circuits for nuclear safety capability, could be adversely affected or whether a new hazard / element is being introduced:

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- The horizontal spatial separation between redundant success paths.
- Cable qualification (IEEE-383).
- The presence of an automatic fire suppression system over the intervening combustible.
- The likely fire propagation direction of burning intervening combustibles in relation to the location of the vulnerable success path.
- The availability of other active and passive compensating fire protection features provided.

Note: For fire protection, "no intervening combustibles" means that there are not significant quantities of in-situ materials that will ignite and burn located between redundant nuclear safety success paths. "Significant quantity" is a judgmental criterion, and the judgment of whether or not intervening combustibles are significant should be made by a fire protection engineer and documented.

5.4 Suppression and Detection System Coverage

When evaluating the adequacy of partial suppression and/or detection coverage, the hazards in the fire areas, zones, or rooms of concern should be considered. The effectiveness of the system should be judged based on the location of the system components (i.e., detector, sprinklers, etc.) relative to the hazards, including the likely spread of fire, and should determine whether or not the system is commensurate with the fire hazards in the area. A specific description of the fire protection features in the areas, zones, or rooms being analyzed is required to justify the change. Low fire loading alone is not a sufficient basis for the evaluation.

5.5 NFPA Code Deviations

As a minimum, applicable NFPA code deviations should be evaluated and justified by a qualified fire protection engineer based on engineering judgment. Guidance, considerations, and criteria provided throughout this document may be utilized when determined to be applicable by the evaluating engineer.