FAQ Number 08-0054 **FAQ Revision** 0

FAQ Title Demonstrating Compliance with Chapter 4 of NFPA 805

Plant: Oconee Nuclear Station Date: August 19, 2010

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Purpose of FAQ:

Based on the revision to Regulatory Guide 1.205 (revision 1), lessons learned from the NFPA 805 Pilot Plants, additional guidance is needed to define the process of demonstrating compliance with Chapter 4 of NFPA 805.

Is this 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):

Sections 4.3.2 and Appendix B Section B.2.2 need revision based on lessons learned during the pilot process

Circumstances requiring guidance interpretation or new guidance:

The original ONS and HNP Pilot 10 CFR 50.48(c) License Amendment Request (LAR) submittals were based upon performing change evaluations against variances from the pre-transition fire protection licensing basis. However, following NRC review of the Pilot Plant original LAR submittals, the NRC had comments on the following issues related to the scope and content of change evaluations and evaluation of the additional risk of recovery actions:

- The transition of all recovery actions used to demonstrate the availability of a success path for the nuclear safety performance criteria should be evaluated using the performance-based approach of Section 4.2.4 of NFPA 805. Specific concerns included whether all recovery actions (including those previously approved or determined to be allowed per FAQ 06-0012 and FAQ 06-0011) needed to be evaluated using the FRE (Section 4.2.4.2 of NFPA 805), which

essentially utilizes the same process and acceptance criteria as a change evaluation.

- A FRE should be performed and documented for each fire area that does not meet the NFPA 805 deterministic requirements of Section 4.2.3 of NFPA 805. This did not align with the processes in NEI 04-02 as endorsed by Revision 0 of RG 1.205. As part of the pilot plant process, FREs (NFPA 805, Section 4.2.4.2) were explicitly performed and documented for VFDRs of the pre-transitional fire protection licensing basis as part of the risk-informed performance-based change process.
- The deterministic approach for meeting the nuclear safety performance criteria (Section 4.2.3 of NFPA 805) includes:
  - Existing Engineering Equivalency Evaluations (NFPA 805 §2.2.7, RG 1.205 Rev. 1 § C.2.3.2)
  - Approved Exemptions/Licensing Actions (NFPA 805 Figure 2.2, § 2.2.7, A.2.2.7, RG 1.205 § C.2.3.2)

RG 1.205 Rev. 1 Regulatory Position C.2.2.4 provides the latest NRC guidance on FRE expectations. This guidance, along with the guidance in NEI 04-02 related to the methods for assessing the change in risk, DID, and safety margins, were used to develop this PI.

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

None

Potentially relevant existing FAQ numbers:

FAQ 07-0030 Establishing Recovery Actions

Response Section:

Proposed resolution of FAQ and the basis for the proposal:

See attached markup of

- NEI 04-02 Section 4.3.2, Nuclear Safety Performance Criteria Transition Review, and
- Appendix B Section B.2.2, Establishing Compliance with Chapter 4 of NFPA 805.

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

See attached markup of NEI 04-02 (25 pages attached).

4.3.2 Nuclear Safety Performance Criteria Transition Review

The nuclear safety performance goals, objectives, and criteria are very similar to the requirements contained in Sections III.G and III.L of 10 CFR 50, Appendix R or applicable sections of NUREG-0800. Each nuclear plant has an approved fire protection program that must ~~demonstrate compliance~~comply with the safe shutdown requirements in Sections III.G and III.L of 10 CFR 50, Appendix R (or applicable sections of NUREG-0800), or has documented exemptions/deviations from these requirements. For these reasons, ~~a substantial~~ part of an existing fire protection program ~~can~~ may be transitioned to a new NFPA 805 licensing basis by performing a transition review and by addressing NFPA 805 topics not typically addressed in a previously approved fire protection program (i.e., fires originating in non-power operational modes and fires resulting in radioactive release). The discussion below outlines the process for demonstrating compliance with Section 2.4.2 and Chapter 4 of NFPA 805.

~~The deterministic branch of Figure 2.2 of NFPA 805 recognizes the new fire protection licensing basis may include components of the existing plant Fire Protection Program (including approved exemptions / deviations, and correctly implemented 10 CFR 50.59 and Fire Protection Regulatory reviews) that can be shown to comply with Chapters 1, 2 and 4. This would be considered compliance with deterministic compliance in NFPA 805 Chapter 4. Otherwise, additional Fire Protection Regulatory reviews may be used to demonstrate equivalence.~~

~~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 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.~~

A systematic approach should be taken when assessing the transitioning plant fire protection program against the nuclear safety requirements of Chapters 1, 2 and 4 of NFPA 805. This is necessary to provide clear documentation of acceptance prior to moving forward with a new licensing basis. Specific acceptance of a plant configuration, as well as changes since original acceptance, should be documented. The review should consist of two ~~fundamental items~~tasks:

1. Review of the safe shutdown methodology for basic attributes (Chapters 1 and 2 of NFPA 805)
2. Fire ~~area by fire~~ area review (Chapter 4 of NFPA 805)

The safe shutdown methodology review evaluates the existing post-fire safe shutdown analyses against the guidance provided in Section 2.4.2 of NFPA 805 for the Nuclear Safety Capability Assessment. This review ensures that the basic elements (systems and equipment selection, circuit selection, equipment and cable location, and fire area assessment) are adequate to support transition to a new licensing basis for fires originating at power operations. Differences identified during the transition review must be reconciled prior to transition to a new risk-informed, performance-based licensing basis. Where the licensing basis is unclear or silent on methodologies, care should be taken to establish a licensing basis going forward. Guidance on performing and documenting the NFPA 805 Chapter 2 methodology reviews is provided in ~~the tables in~~ Appendix B.2.1~~-2~~ of this guidance.

A simplified flowchart of the fire ~~area by fire~~ area transition review is provided as Figure 4-3 below.

Field Code Changed

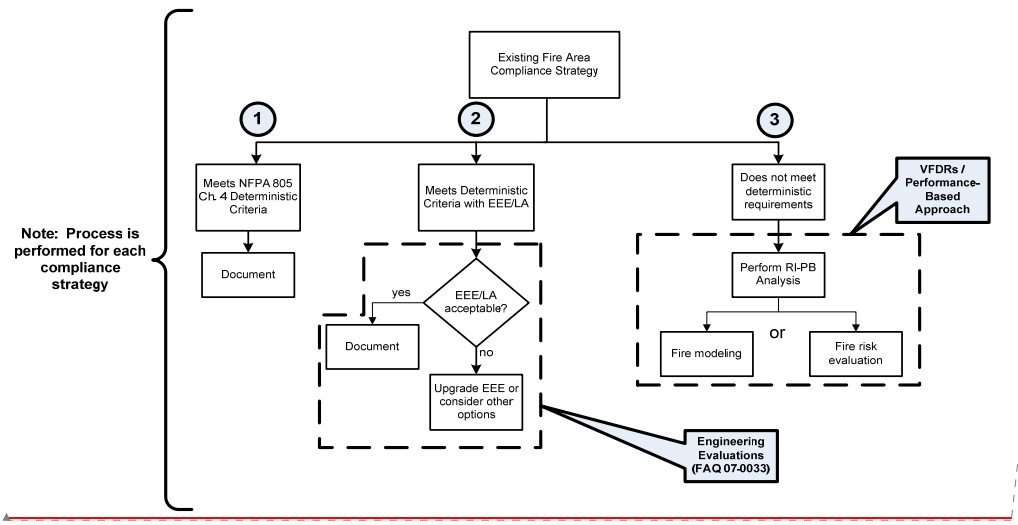

Figure 4-3 - Fire Area ~~by Fire Area~~ Transition Process (Simplified)

The review is intended to identify and document how compliance strategies for each fire area:

1. Align with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5; or
2. Align with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5 with correctly implemented supporting engineering evaluations (Engineering Equivalency Evaluations or Licensing Actions); or
3. Do not align with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5. Items that do not meet the deterministic requirements can be modified to bring into compliance or evaluated using risk-informed, performance-based methods as part of the transition.

~~The fire area by fire area review determines whether the CLB is intact and documented adequately to support the transition. The review is intended to identify and document how each fire area:~~

~~Aligns with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5; or~~

~~Aligns with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5 with approved exemptions or deviations from 10 CFR 50 Appendix R; or~~

~~Aligns with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5 with correctly implemented supporting engineering evaluations (i.e., Generic Letter 86-10 evaluations or calculations); or~~

~~Does not align with the NFPA 805 Chapter 4 methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5 and either can or cannot be evaluated under the CLB. Items outside the CLB would be evaluated using risk-informed, performance-based methods as part of the transition review.~~

Differences identified during the ~~fire area by~~ fire area transition review should be reconciled prior to transition to a new risk-informed, performance-based licensing basis. Items that can be addressed within the bounds of the CLB prior to the transition (i.e., by performance of an engineering equivalency evaluation) should be addressed and documented as part of the transition process. Differences that cannot be resolved within the bounds of the CLB may also be resolved by changing the plant/program to align with the NFPA 805 Chapter 4 deterministic methods for meeting the nuclear safety performance criteria in NFPA 805 Section 1.5.

~~Operator manual actions being transitioned to recovery actions that are not allowed under the current regulatory framework or do not have previous NRC approval should be evaluated using the change process. See Appendix B-2 of this document for additional guidance.~~

Where the licensing basis is unclear or silent on fire area compliances, care should be taken to establish a licensing basis going forward. Guidance on performing and documenting the NFPA 805 Chapter 4 reviews is provided in the tables in Appendix B-2 of this guidance. Guidance on reviewing existing engineering equivalency evaluations for transition is provided in Appendix B.3 of this document.

RG 1.203 Section 2.3 recognizes the new fire protection licensing basis may include components of the existing plant Fire Protection Program (including approved exemptions / deviations, and correctly implemented 10 CFR 50.59 / Fire Protection Regulatory reviews) that can be shown to comply with Chapters 1, 2 and 4. This would be considered compliance with deterministic requirements in NFPA 805 Chapter 4.

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 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.

B.2.2 Establishing Compliance with Chapter 4 of NFPA 805

Background

The purpose of this section is to provide guidance for demonstrating compliance with Chapter 4 of NFPA 805 for 'at power conditions'. This section addresses the fire area review, with specific clarification on the documentation of variances from the deterministic requirements of Section 4.2.3 of NFPA 805 (VFDRs). This section also provides guidance on the performance-based approaches of Section 4.2.3 of NFPA 805 (i.e. Fire Modeling or Fire Risk Evaluations). The guidance for the non-power analysis is contained in Section 4.4.3 and Appendix F to this document.

Prior to beginning this process the Nuclear Safety Capability Assessment (i.e., the 10 CFR 50 Appendix R / NUREG-0800 Safe Shutdown Analysis or a transition Nuclear Safety Capability Assessment) should be complete. This includes the incorporation of the following treatments:

- Multiple Spurious Operations (MSO)
- Establishing the safe and stable conditions for the plant including the determination of the strategy and assumptions concerning the division between the At-Power and Non-Power portions of the nuclear safety capability assessment.
- Fire Suppression Activity effects on the ability to achieve the nuclear safety performance criteria
- The determination of Primary Control Stations

Definitions

For purposes of this process the following definitions were used:

- At-Power Analysis – Identifies systems and equipment required to place the plant in a safe and stable condition following a fire occurring while the plant is at power, or while maintaining hot standby or hot shutdown (as clarified by the definition of safe and stable).
- Non-Power Analysis – Identifies the set of systems and equipment required to support reasonable assurance that nuclear safety performance criteria are met for a fire occurring in the site specific treatment(s) for non-power operational modes.
- Primary Control Station –See NFPT 805 Section 1.6.52 and Regulatory Guide 1.205.
- Safe and Stable Conditions – See NFPA 805 Section 1.6.56
- Variance from the Deterministic Requirements (VFDRs) – Conditions that do not meet the requirements of NFPA 805 Section 4.2.3.

Process Overview

The process for determining compliance with Chapter 4 of NFPA 805 can be divided into the following steps:

- Step 1 – Assemble documentation
- Step 2 – Document Fulfillment of Nuclear Safety Performance Criteria
- Step 3 – VFDR Identification, Characterization, and Resolution Considerations
- Step 4 – Performance-Based Evaluations
  - Fire Modeling Evaluations

- Fire Risk Evaluations
- Step 5 – Final VFDR Evaluation
- Step 6 – Document Required Fire Protection Systems and Features

This process is depicted in Figure B-TBD1.

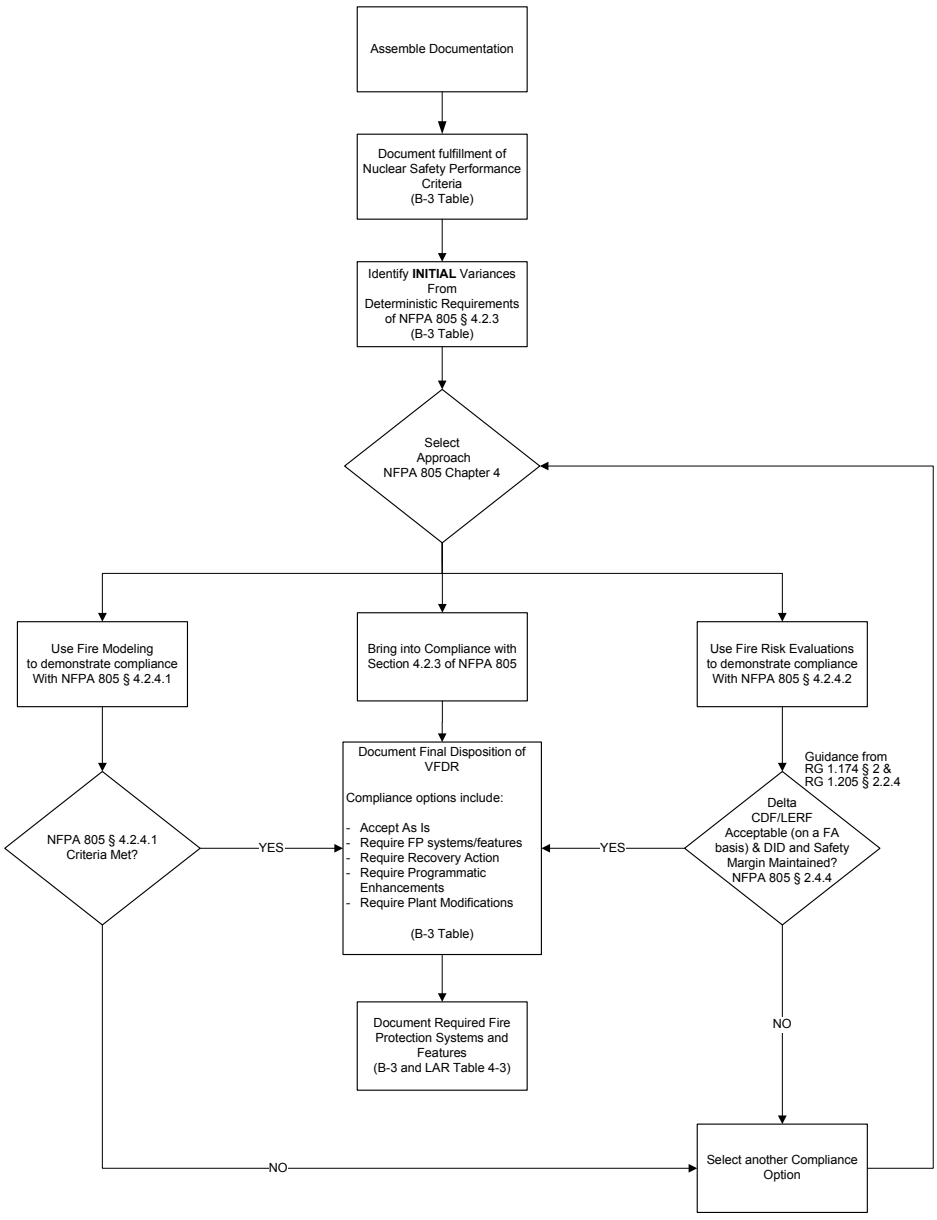

Figure B-TBD1 – NFPA 805 Chapter 4 Compliance Assessment Process

B.2.2.1 Step 1 – Assemble Documentation

Gather industry and plant-specific fire area analysis analytical and licensing basis documents. The documentation should be organized by the fire area to the extent possible. Examples of documentation to be assembled include:

- Plant specific calculations/analyses for:
  - Fire area compliance assessment and supporting analyses
  - Operator manual action (Recovery Action) feasibility assessments
  - Resolution of multiple spurious operations
- Results of the Nuclear Safety Capability Assessment Methodology Review (NEI 04-02 Table B-2):
- Results of the Existing Engineering Equivalency Evaluations and Licensing Actions Reviews.
- Corrective action documents related to compliance with 10 CFR 50, Appendix R (or FP license condition, as appropriate), such as:
  - Unapproved or 'not allowed' pre-existing operator manual actions (including feasibility issues)
  - Cable separation/protection issues
  - Raceway fire barrier deficiencies
  - Concerns related to fire-induced spurious operations

B.2.2.2 Step 2 – Document Fulfillment of Nuclear Safety Performance Criteria

The purpose of this step in the process is to determine how NFPA 805 Chapter 4 is met for each nuclear safety performance criteria. This entails 1) reviewing the current safe shutdown analysis (or new nuclear safety capability assessment), including the evaluation of MSOs on a fire area basis, 2) reviewing fire suppression activity effects, and 3) reviewing licensing actions and existing engineering equivalency evaluations. If a nuclear safety performance criterion is not met using the deterministic approach (NFPA 805 Section 4.2.3 including engineering evaluations and previously approved licensing actions) then compliance will be achieved via a proposed modification, or a VFDR will be generated to determine if the criterion can be met using the performance-based approach.

B.2.2.2.1 Assess Accomplishment of Nuclear Safety Performance Goals

On a fire area basis each nuclear safety performance criteria (NSPC) of NFPA 805, Section 1.5.1 will be reviewed and the method of accomplishing these criteria documented. The method of accomplishment should include a high level summary of required strategies that provide reasonable assurance that, in the event of a fire, the plant is not placed in an unrecoverable condition. To assist in the documentation of the methods of accomplishment the following is suggested:

- Document the Method of Accomplishment in summary level form for the fire area. Attempt to use concise, consistent terminology that provides a high level summary of credited strategies. For each NSPC include a clear positive statement that the NSPC is met or explain what exceptions are taken (and the basis for each). This consistency

should be utilized for statements within a given fire area and for similar statements in different fire areas. Examples of high level statements are:

- The reactor core isolation cooling pump flowpath is available.
- Cooldown using RHR Pump A and RHR Heat Exchanger A is available in suppression pool cooling mode.
- RC makeup from the Control Room using HPI Pump A for makeup and RCP seal injection with suction aligned from the BWST and RC letdown through RV head vent valves. Isolation of RCS is necessary to support inventory control.
- Control Room operation of makeup/charging using HPI Pump A, pressurizer heaters, and pressurizer safety relief valves credited for controlling system pressure.
- Manual reactor trip from the Control Room; shutdown margin maintained by adequate concentration of borated water from the BWST using HPI Pump A.

- Documenting the assessment of performance goal accomplishment for each fire area, reviewing fire area licensing actions, and reviewing engineering evaluations all may result in the creation of VFDR items that may need to be reviewed and assessed as part of the performance-based approach. Each VFDR item should be assigned its own distinct tracking number as opposed to being part of a group. See Section B.2.2.2.3 for additional clarification on the deterministic compliance with NFPA 805 Section 4.2.3.

  All VFDR items should be reviewed and categorized, by fire area and topic, if appropriate, in order to gain an overall understanding of the magnitude and complexity of the individual issues, as well as their aggregate impact. VFDR items associated with other tasks (e.g., Fundamental Fire Protection Program and Design Elements Review) should also be considered and where possible categorized by fire area and topic. The VFDRs are candidates for resolution using the performance-based approach of NFPA 805.

- Once Step 3, VFDR Identification and Characterization and Resolution Considerations, is complete, the Method of Accomplishment should be revised to denote if a VFDR for a particular performance criterion exists. Example: *Variance from the deterministic requirements of NFPA 805 exists for this performance criterion; Fire Risk Evaluation required.*

  The information documented in the transition report is intended to be summary level information that provides a concise summary of information, with references to specific supporting analyses and documents. The documentation of items such as fire-induced circuit failures and disposition of recovery actions are not expected to be documented in detail in the transition report. For example, the results of the nuclear safety capability circuit analysis are important in establishing compliance. However, it is not practical to document the detailed results for each VFDR in the transition report. Sufficient documentation should be available within the referenced documents such that traceability is provided for the specifics of the VFDR and the performance-based resolution.

B.2.2.2.2 Document Evaluation of Effects of Fire Suppression Activities

Section 2.4.1 of NFPA 805 states that the "effects of fire suppression activities on the ability to achieve the nuclear safety performance criteria shall be evaluated."

Evaluate the effects of fire suppression activities on the ability to achieve the nuclear safety performance criteria. Note previously performed analyses for III.G.3.b compliance or to address Information Notice 83-41 "Actuation of Fire Suppression System Causing Inoperability of Safety-Related Equipment" may provide some or all of the necessary information.

Document in the B-3 table the evaluation of the effects of fire suppression activities on the ability to achieve the nuclear safety performance criteria.

B.2.2.2.3 Clarification of Deterministic Compliance

B.2.2.2.3.a Fire Area Licensing Action Reviews

When reviewing a fire area to determine an NFPA 805 Chapter 4 compliance basis, licensing actions (exemptions/deviations/safety evaluations) may be used to demonstrate compliance with specific deterministic fire protection requirements. The continued validity of the licensing action should be verified (See NFPA 805 Section 2.2.7 and Regulatory Guide 1.205 Section 2.3.2). See additional information concerning recovery actions in Section B.2.3.

B.2.2.2.3.b Existing Engineering Equivalency Evaluation Reviews

When reviewing a fire area to determine an NFPA 805 Chapter 4 compliance basis, existing engineering equivalency evaluations may be used to demonstrate compliance with specific deterministic fire protection requirements. The continued validity of the existing engineering equivalency evaluations should be verified (See NFPA 805 Section 2.2.7 and Regulatory Guide 1.205 Section 2.3.2). See Appendix B-1 of this document for the process of evaluating existing engineering equivalency reviews.

B.2.2.2.3.c Pre-transition OMA Review

NFPA 805 Section 4.2.3.1 states:

> *"One success path of required cables and equipment to achieve and maintain the nuclear safety performance criteria without the use of recovery actions shall be protected by the requirements specified in either 4.2.3.2, 4.2.3.3, or 4.2.3.4, as applicable. Use of recovery actions to demonstrate availability of a success path for the nuclear safety performance criteria automatically shall imply use of the performance-based approach as outlined in 4.2.4."*

Perform a review of pre-transition OMAs to determine those actions taking place outside of the main control room or outside of the primary control station(s) that demonstrate the availability of a success path for the nuclear safety performance criteria. If the activity to demonstrate a success path for the nuclear safety performance criterion takes place outside of a MCR or PCS then it is classified as a potential recovery action and will be retained for further evaluation in the process (categorization as a VFDR). If activities are performed from the MCR or PCS, then the activity is not considered a recovery action. These activities are compliant with Section 4.2.3.2 of NFPA 805. See SectionB.2.3 for additional information.

B.2.2.3 Step 3 – VFDR Identification and Characterization and Resolution Considerations

Variances may be generally categorized as either a pre-transition OMA, separation issue or a degraded fire protection system or feature. In this step of the process proposing a modification to bring the variance into deterministic compliance is also a possible approach. All VFDRs not

brought into deterministic compliance with NFPA 805 Section 4.2.3 will be evaluated per the performance-based approach of NFPA 805, Section 4.2.4. Note: If an acceptable initial performance based solution cannot be achieved for a given VFDR, other solutions should be considered.

Non-compliances with the current licensing basis should be identified in the corrective action program and annotated as being planned for resolution as part of the NFPA 805 transition process. VFDRs that do not meet NFPA 805 Section 4.2.3, but are compliant with the pre-transition fire protection licensing basis (e.g., feasible alternative shutdown operator manual actions, previously approved operator manual actions, etc.) are not non-compliances and therefore do not need to be in the corrective action process. These VFDRs should be identified in the NFPA 805 Transition B-3 Table, as VFDRs requiring FREs.

The VFDR problem statements should be written with enough detail to support fire risk evaluations. For example:

- Description: A short text description of the variant condition including components and functions (ex. auxiliary feedwater pump), initiating failure(s) (cable/power/interlock/control failures, etc.), and general characterization of the concern (ex. spurious start of pump and pump remains energized, cable failures resulting in undesired lineup, etc.).
- A statement that describes the section of NFPA 805 that is not met, type of VFDR (pre-transition OMA, separation issue or degraded fire protection system), and proposed evaluation per applicable NFPA 805 section.

B.2.2.4 Step 4 – Performance-Based Evaluations

NFPA 805 Section 4.2.4 provides a "performance-based alternative to the deterministic approach provided in 4.2.3". The following subsections provide guidance on the fire modeling and fire risk evaluations.

B.2.2.4.1 Fire Modeling Evaluations

NFPA 805 Section 4.2.4.1 identifies the specific use of fire modeling as a performance-based method. The Fire Modeling Evaluation process consists of the following steps:

- Step 1 – Identify the targets
- Step 2 – Establish damage thresholds
- Step 3 – Determine limiting condition(s)
- Step 4 – Establish fire scenarios (Maximum Expected and Limiting)
- Step 5 – Determine protection of required nuclear safety success path(s)
- Step 6 – Provide operations guidance, as necessary.

The overall acceptance of the transition Fire Modeling Evaluation will be in the form of a license amendment per 10 CFR 50.90, as required by 10 CFR 50.48(c)(3)(i). The acceptance criteria for the Fire Modeling Evaluation consist of two parts.

- **Target Damage Occurs?** – The fire modeling analysis defines and evaluates a postulated scenario involving the Maximum Expected Fire Scenario (MEFS). If target set damage does not occur then first acceptance criterion is met.

- **MEFS<<LFS?** – The performance of fire modeling involves a degree of uncertainty. This uncertainty is addressed indirectly by the determination of the Limiting Fire Scenario (LFS). A comparison of MEFS and LFS is used to determine if a sufficient fire modeling margin exists. If sufficient fire modeling margin exists, then the fire modeling approach is acceptable. A quantitative risk assessment does not have to be performed since qualitatively the conclusion can be made that the VFDR has a minimal impact on risk (MEFS does not generate damage, and MEFS - LFS margin is sufficiently large to address uncertainties in modeling.)

RG 1.205, Regulatory Position 4.2 and Section 5.1.2 of NEI 04-02, provide guidance on documenting the fire models used, and justifying that these fire models and methods are acceptable for use in performance-based analyses, and are used within their limitations and with the rigor required by the nature and scope of the analyses.

B.2.2.4.2 Fire Risk Evaluations

NFPA 805, NEI 04-02, and RGs 1.205 and 1.174 all provide requirements and guidance on the Fire Risk Evaluation (FRE) process.

The following subsections describe the methodology used to prepare a FRE and to evaluate the results. Figure B-TBD2 is an outline of the FRE process during NFPA 805 transition.

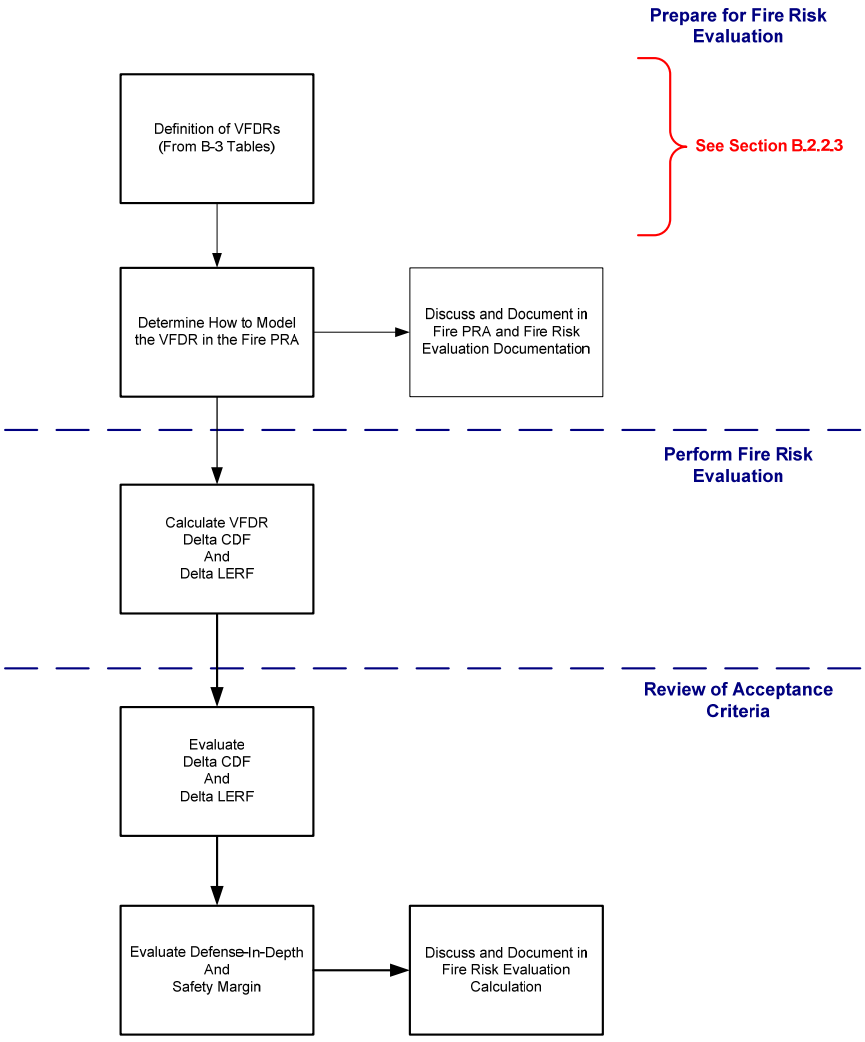

Figure B-TBD2 – FRE Process (NFPA 805 Transition)

B.2.2.4.2.a Prepare for the Fire Risk Evaluation

Variant vs. Compliant Condition

The FRE process begins by defining the variant condition to be examined (VFDRs identified in Step 3 of this process) and the compliant configuration as defined by NFPA 805 Section 4.2.3.

The deterministically compliant condition is defined as that plant condition or configuration that is consistent with Section 4.2.3 of NFPA 805 (shown as Case 2 in Figure B-TBD3). The variant condition or configuration, either 'as found' or proposed by a plant change, that is not consistent

with Section 4.2.3 of NFPA 805, is defined as the variant condition (shown as Case 1 in Figure B-TBD3).

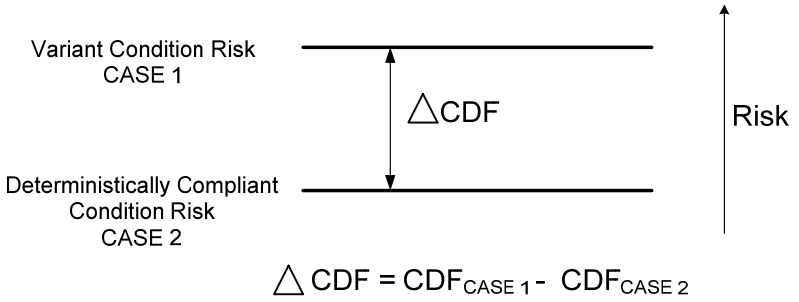

Figure B-TBD3 – Compliant versus Variant Conditions

The definition of the variant condition may not always be easily defined. Judgment may be necessary in order to calculate a change in risk. For example, pre-transition operator manual actions not taken at the Primary Control Station that are currently characterized as alternative shutdown (pre-transition) do not have a 'deterministically compliant condition' for comparison purposes, therefore some judgment may be necessary. One option would be to define a 'compliant case' that is not based on the actual fire area configuration, but based on a configuration that meets the deterministic criteria of Section 4.2.3 of NFPA 805. Regulatory Position 2.2.4 of RG 1.205 Rev. 1 provides clarification on this topic.

Organization and Grouping of Fire Risk Evaluations

Due to the nature and complexity of individual changes that will be addressed as part of the transition FRE, it is necessary to organize and group individual changes. To the maximum extent possible, VFDRs being addressed by FREs should be organized by plant location (i.e., fire area). The rationale for this grouping is:

- Key analytical tools for measuring compliance (e.g., the nuclear safety capability assessment) are organized in this manner. This will facilitate the clear documentation of a 'compliant case' for use in the evaluation.
- Analytical tools for measuring fire risk (i.e., Fire PRA) are primarily spatially oriented and can focus analyses on specific targets and scenarios.
- This grouping supports reporting requirements for the NFPA 805 transition LAR in RG 1.205, Revision 1.

Preparatory Evaluation – Fire Risk Evaluation Team Review

Using the information obtained during the development of the NEI 04-02 B-3 Table and the fire PRA, a team review of the VFDR should be performed. Depending on the scope and complexity of the VFDR, the team may include the Safe shutdown/NSCA Engineer, the Fire Protection Engineer, and the Fire PRA Engineer. The purpose and objective of this team review would be to address the following;

1. Ensure that other discrepancies on the detailed list that can be screened out for other reasons (e.g., a discrepancy that is already corrected, but not updated in the original data source, etc.) are updated.
2. Consolidate the information into a manageable group of issues that can be assessed as part of the same evaluation. Examples of logical groupings within a fire area include:
    - Multiple cable failures within a given fire area for a single component that represent the same component failure. These may be identified as separate line items in a safe shutdown/NSCA database report, but represent the same issue for resolution.
    - Multiple component-cable failures, where the multiple failures are required in order to get the undesired state. For example, if the undesired state is loss of a pump power supply concurrent with a valve failing to open, then the failure of 'both' components (due to the cables/equipment in the fire area) should be grouped together for target identification. Note that exported data from the safe shutdown/NSCA database may not include all of the information necessary to identify the component combinations and review of the logic model and fire area details may be necessary.
    - Component failures related to a single failure (e.g., a single power supply or interlock circuit cable failure in a fire area cascades / propagates to affect multiple components).
    - Failure modes related to a single plant damage state (e.g., several component failures result in loss of cooling, tank draindown, etc.) that may be resolved by a single solution.
3. Review the Fire PRA to determine if the discrepancies are adequately reflected in the Fire PRA. For example:
    - Perform a confirmatory review of the NUREG/CR-6850 Task 2 Component Selection, Task 3 Cable Selection, and Task 5 Fire-Induced Risk Model results, as necessary, to ensure that the modeling of the VFDR in the Fire PRA is appropriate.
    - If the discrepancy involves the potential spurious opening of a valve and undesired consequences, then the PRA should be modeled to reflect the same failure mode (consequence) or a justification provided in PRA documentation.
    - Appropriate modeling of fire-induced hot shorts resulting in spurious operation should be ensured. If assigned, the 'probability of spurious actuation based on cable damage' failure probabilities should account for the type of cable and configuration (multiconductor / single conductor, thermoset / thermoplastic, cable tray / conduit).
4. If the Fire PRA does not adequately reflect the ability to measure the change associated with the discrepancy, update the Fire PRA model and associated documentation or document why the modeling in the Fire PRA provides sufficient treatment to bound the risk impact.
5. Based on the inputs above and grouping of issues, establish a discrete list of targets based on the VFDR. For safe shutdown/NSCA related issues, this primarily involves cables.
6. For electrical cables that are the targets of concern, identify the raceway routing and termination points within the fire area. Perform walkdowns as necessary to refine target locations if not previously performed as part of the Fire PRA development.

7. Identify transient and fixed ignition source fire scenarios.
8. Identify preliminary FRE scenario candidates. These scenarios may be refined based upon additional reviews. Consider truncating the review to only those fire initiating events whose calculated CDF is greater than 1E-08/yr, or whose calculated LERF is greater than 1E-09/yr. If this truncation is used, then ensure that the reporting of the change in CDF and LERF accounts for the truncation and is appropriately documented.

B.2.2.4.2.b Perform Fire Risk Evaluation

An FRE is typically performed by the Fire PRA Engineer but depending on the complexity and results, coordination with and further input/reviews by the Safe Shutdown/NSCA Engineer and the Fire Protection Engineer may be needed.

Use of Bounding Approaches

Simplifying approaches may be used to bound the risk characterization of VFDRs in the fire area. For example, the point estimate of fire risk (CDF/LERF) for all of the scenarios in a fire area may be assumed to serve as a measure of the maximum possible ΔCDF and ΔLERF associated with the area. The use of surrogates (e.g., CDF for all of the scenarios within a fire area) provides a conservative estimate of risk for a fire in an area, would simplify long term configuration management of analyses, and would allow resources to be focused on refining and addressing variances that are risk significant. This approach may prove to be cost-effective for addressing risk associated with complicated scenarios with many variables (e.g., multiple spurious operations) in a fire area that otherwise has non-significant fire risk contribution. However, the use of bounding approaches does not obviate the need to perform a confirmatory review of the NUREG/CR-6850 Task 2 Component Selection, Task 3 Cable Selection, and Task 5 Fire-Induced Risk Model results, as necessary, to ensure that the modeling of the VFDR in the Fire PRA is appropriate.

Change in Risk Calculation

The change in risk (ΔCDF, ΔLERF) is the difference between the aggregate risk for the condition associated with the VFDR and the aggregate risk for a deterministically compliant condition. In most cases, the risk associated with the VFDR condition is the same as the risk results from the Fire PRA and reflects the in-situ plant configuration. In other cases, the VFDR condition may include some variation of the in-situ plant configuration as defined in the VFDR description. The change in risk is then determined by comparing this risk with that of a configuration which is deterministically compliant.

The compliant condition is created by manipulating the Fire PRA model to ‘remove’ the VFDR(s) and thereby creating a compliant condition. The necessary Fire PRA manipulations should be adequately documented to facilitate review and reproduction. Fire PRA manipulations may involve excluding specific PRA basic events to remove the potential fire induced failure associated with the VFDR.

For low risk fire areas a simplified approach could be used where the change in risk is bounded by creating a single compliant case with all of the fire-induced failures associated with each VFDR removed simultaneously. To facilitate identification of the important risk contributors in this case, the delta risk for the fire area could be taken as the summation of the individual delta risk contributions for each VFDR in the fire area. To confirm that potential masking of change

in risk has not occurred, this result should be compared to the overall change in risk by considering all VFDRs in the fire area concurrently.

Additional Risk of Recovery Actions - General

NFPA 805 requires an explicit requirement for the treatment of additional risk of recovery actions, as discussed in RG 1.205 Rev. 1 Regulatory Position 2.4. The additional risk of recovery actions can be evaluated using one of the following processes:

- Calculate the CDF (LERF) for the condition representing the variant condition. Subtract the CDF (LERF) obtained by assuming that the plant was modified to remove the VFDR; this gives the ΔCDF and ΔLERF associated with the VFDR.
- Model the recovery action explicitly in the Fire PRA, with an appropriate human error probability and calculate the CDF (LERF). Subtract the CDF (LERF) obtained by assuming that the plant was modified to remove the VFDR; this gives the ΔCDF and ΔLERF associated with performing the action compared to maintaining the otherwise fire failed equipment free of fire damage.
- Report the applicable portion of the CDF/LERF (scenario or group of scenarios) for the fire area as a surrogate for the change in risk.
- Perform fire modeling in accordance with NFPA 805 Section 4.2.4.1 to demonstrate that the risk of the recovery action compared to deterministic compliance negligible.

The total increase or decrease in risk associated with recovery actions should be consistent with the guidelines of RG 1.174.

Additional Risk of Recovery Actions – Alternative or Dedicated Shutdown

The evaluation of the additional risk of recovery actions for fire areas that are associated with pre-transition alternative or dedicated shutdown capability requires special treatment as discussed in RG 1.205 Rev. 1 Regulatory Position 2.4. The following approach can be used to perform the FRE (i.e., determine the additional risk presented by the use of recovery actions) for areas that involve alternative or dedicated shutdown.

For the purposes of the transition to NFPA 805, the approach that should be used to assess this incremental risk is based on first identifying those fire initiating events that create/require a demand for implementation of alternative/dedicated shutdown strategies. If the cumulative CDF/LERF associated with these initiating events is very low, then a simple summation should be used to provide a bounding value. It is noted that a common risk treatment for these cases is to apply a surrogate conditional core damage probability (CCDP) that is intended to bound the human actions as well as the random equipment failures. In such cases, it may be necessary to specifically address the individual recovery actions and demonstrate that the related human error probability (HEP) is appropriately included in the surrogate CCDP that is used.

If this bounding treatment is judged to be overly conservative, then it will be necessary to further refine the fire PRA so that those recovery actions are isolated and treated separately in the Fire PRA so that their specific risk contribution can be determined.

Cold Shutdown Considerations

Depending on the plant-specific definition of the safe and stable endpoint, the scope of treatment of VFDRs may be different. If a plant chooses to maintain the safe and stable endpoint for

NFPA 805 as cold shutdown, the VFDR identification in the B-3 Table should include those items related to achieving and maintaining cold shutdown.

If the plant has defined safe and stable at a different mode, then the VFDRs will be based on that defined safe and stable state.

If the VFDR involves equipment/cables required only for cold shutdown or whose function is not modeled in the PRA, then a qualitative risk assessment will be performed. This qualitative assessment should include the following:

- The desired safe end state for the traditional treatment of post fire safe shutdown under the provisions of 10 CFR 50.48(b) is cold shutdown. The transition to invoke the provisions of 10 CFR 50.48(c) includes the use of a Fire PRA. The safe end state evaluated in a PRA is not cold shutdown, but is instead a condition characterized as 'safe and stable.' This is typically hot standby/shutdown conditions. The PRA treatment of the plant response to a fire event does not necessarily require or credit the use of plant systems exclusive to cold shutdown. As such, the treatment of any such systems and functions in the context of a FRE would generally result in no measurable impact on the calculated plant risk.
- There are however, some possible exceptions.
  - If the fire induced plant transient is of such a nature that in order to achieve safe and stable conditions, cold shutdown related systems and/or functions are required, the PRA would inherently require those functions to be successful. In these cases, the calculated risk metrics for the postulated fire event includes the consideration of failures that would disable the systems and/or functions, or
  - If the variance would affect achievement of a key safety function during a non-power higher risk-evolution, then options should be considered in accordance with the non-power operations methodology.

B.2.2.4.2.c Review of Acceptance Criteria

The overall acceptance of the transition FRE will be in the form of a license amendment per 10 CFR 50.90, as required by 10 CFR 50.48(c)(3)(i). Acceptance criteria for individual FREs are based on ensuring:

- The change in core damage frequency (ΔCDF) is acceptable, and
- The change in large early release frequency (ΔLERF) is acceptable, and
- Defense-in-depth and safety margins are maintained.

The change in CDF/LERF should be addressed individually (for each fire area) and cumulatively (for the entire plant) per RG 1.205 Rev. 1 Regulatory Position C.2.2.4. The defense-in-depth and safety margin treatment should be documented on an area basis. The results of this review, including a comprehensive assessment, should be documented. The results of the review should be used as input for determination of systems, features and program elements to be upgraded, as well as included in the Plant Monitoring Program.

If the FRE meets the acceptance criteria described below, this is confirmation that a success path effectively remains free of fire damage and that the performance-based approach is acceptable per Section 4.2.4.2 of NFPA 805. (Ref. NEI 04-02, Sections 5.3.4.2 and 5.3.5, ML041270399, ML041420012, ML041740365).

Risk Acceptance Criteria

The transition risk evaluation should be measured quantitatively for acceptability using the ΔCDF and ΔLERF criteria from RG 1.174, as clarified in RG 1.205 Rev. 1 Regulatory Position C.2.2.4. The results of the acceptability determination shall be clearly documented in the calculations/analyses. The acceptance criteria of RG 1.174, which are referenced in RG 1.205 Rev. 1 Regulatory Position C.2.2.4, are summarized in the following table.

Table 3 - RG 1.174 Acceptance Criteria

Region	ΔCDF/yr	ΔLERF/yr	Status	Comments/Conditions
I	≥ 1.0E-05	≥ 1.0E-06	Unacceptable	Proposed changes in this region are not acceptable, regardless of baseline CDF and LERF.
II	< 1.0E-05 and ≥ 1.0E-06	< 1.0E-06 and ≥ 1.0E-07	Acceptable w/ conditions	Proposed changes in this region are acceptable provided the cumulative total CDF from all CDF initiators is less than 1.0E-04/yr and from all LERF initiators is <1E-5/yr. Cumulative effect of changes must be tracked and included in subsequent changes.
III	< 1.0E-06	< 1.0E-07	Acceptable w/ conditions	Proposed changes in this region are acceptable provided the cumulative total CDF from all initiators is less than 1.0E-03/yr and from all LERF initiators is <1E-4/yr. Cumulative effect of changes must be tracked and included in subsequent changes.

If the risk evaluation determines that ΔCDF and ΔLERF are acceptable and that defense-in-depth and safety margins are maintained, then document the results. This is confirmation that a success path effectively remains free of fire damage.

If the risk evaluation determines that either ΔCDF or ΔLERF are not acceptable, then document the results are not acceptable and alternatives should be pursued until the quantitative acceptance criteria are met.

Defense-in-Depth Criteria

A review of the impact of the change on defense-in-depth shall be performed, using the guidance below from NEI 04-02. NFPA 805 defines defense-in-depth as:

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

In general, the defense-in-depth requirement is satisfied if the proposed change does not result in a substantial imbalance among these elements (or echelons).

The review of defense-in-depth is typically **qualitative** and should address each of the elements with respect to the proposed change. Defense-in-depth may be assessed at a compartment, fire scenario, or fire area basis if applicable to multiple changes.

Fire protection features and systems relied upon to ensure defense-in-depth should be clearly identified in the assessment (e.g., detection, suppression system).

Consistency with the defense-in-depth philosophy is maintained if the following acceptance guidelines, or their equivalent, are met:

- A reasonable balance is preserved among 10 CFR 50.48(c) defense-in-depth elements.
- Over-reliance and increased length of time or risk on performing programmatic activities to compensate for weaknesses in plant design is avoided.
- Pre-fire nuclear safety system redundancy, independence, and diversity are preserved commensurate with the expected frequency and consequences of challenges to the system and uncertainties (e.g., no risk outliers). (This should not be construed to mean that more than one safe shutdown/NSCA train must be maintained free of fire damage.)
- Independence of defense-in-depth elements is not degraded.
- Defenses against human errors are preserved.
- The intent of the General Design Criteria in Appendix A to 10 CFR Part 50 is maintained.

Safety Margin Criteria

A review of the impact of the change on safety margin should be performed. An acceptable set of guidelines for making that assessment is summarized below. Other equivalent acceptance guidelines may also be used.

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

The requirements related to safety margins for the change analysis is described for each of the specific analysis types used in support of the FRE.

These analyses can be grouped into three categories. These categories are:

- Fire Modeling
- Plant System Performance
- PRA Logic Model

Additional information is contained in NEI 04-02 Section 5.3.5.3.

B.2.2.4.2.d Fire Area Change in Risk Summary

RG 1.205, Rev. 1, Regulatory Positions 2.2.4.1 and 2.2.4.2 provide guidance on the reporting of fire risk evaluations by fire area. Refer to RG 1.205 Rev. 1 for specific guidance on acceptance criteria and considerations for previously approved recovery actions.

The change in risk for all fire scenarios affected by the VFDRs for a particular fire area should be combined to report the change in risk for the fire area. See Table B-TBD1 for an example. The process for transition to NFPA 805 as well as the ongoing maintenance of the program post-transition includes provisions for offsetting risk reductions. In general, offsetting risk reductions can only be claimed to the extent that they affect fire risk. Reductions arise from other hazard categories such as internal events cannot be claimed without NRC review and approval. For the purposes of the transition process, the changes in plant risk should be summarized and

aggregated. The total risk increase associated with VFDRs should be provided as well as the total risk reduction associated with plant modifications or other changes. The net change in risk for each fire area should be provided as well as the same type of information for the plant in total.

Table B-TBD1 Unit X Fire Area Risk Summary

Fire Area	Area Description	NFPA 805 Basis	Fire Area CDF/LERF	VFDR (Yes/No)	RAs (Yes/No)	Fire Risk Eval Δ CDF/LERF	Additional Risk of RAs

B.2.2.5 Step 5 – Final Disposition

Once an acceptable performance-based evaluation has been completed for a fire area, the B-3 table will be updated to summarize the final disposition of the VFDRs, including the documentation of the post-transition NFPA 805 Chapter 4 compliance basis. The performance-based evaluation should contain all pertinent summary information to carry over to the B-3 table so that the final disposition of the VFDR is clear.

For recovery action compliance strategies, ensure the manual action feasibility analysis of the required recovery actions is completed. If a recovery action cannot meet the feasibility requirements established in Section B.2.3, then alternate means of compliance must be considered.

Document the post-transition regulatory basis for the fire area. In accordance with NFPA 805 Section 4.2.2 an approach (either deterministic or performance-based) must be selected. Statements should be high level, concise statements, examples include:

- NFPA 805 Section 4.2.3 Deterministic Approach (specify section)
- NFPA 805 Section 4.2.4.1 Performance-Based Approach – Fire Modeling
- NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation
- NFPA 805 Section 4.2.4.1 Performance-Based Approach – Fire Modeling with simplifying deterministic assumptions
- NFPA 805 Section 4.2.4.2 Performance-Based Approach – Fire Risk Evaluation with simplifying deterministic assumptions

B.2.2.6 Step 6 - Document Required Fire Protection Systems and Features

In accordance with 10 CFR 50.48(c) "Once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design and qualification shall meet the applicable requirement of Chapter 3".

Fire protection systems or features are required for NFPA 805 Chapter 4 compliance to achieve the performance criteria of Section 1.5 if they are required to meet:

- NFPA 805 Section 4.2.3, Deterministic Approach, or
- NFPA 805 Section 4.2.4, Performance-Based Approach

Review the NFPA 805 Section 4.2.3 compliance strategies (including fire area licensing actions and existing engineering evaluations) and the NFPA 805 Section 4.2.4 compliance strategies(including simplifying deterministic assumptions) to determine which fire protection systems and features form the basis for acceptability of the given compliance strategy. The required fire protection systems and features are then subject to the applicable requirements of NFPA 805 Chapter 3. The 'required' fire protection systems and features should be documented, with focus on systems and features within a fire area that have Chapter 3 requirement. Examples of systems and features within a fire area that will be evaluated are:

- Fixed suppression systems
- Detection systems
- Electrical Raceway Fire Barrier Systems
- Fire Barriers

The documentation of required fire protection systems and features in this step does not include the documentation of the fire area boundaries. Fire area boundaries should be known prior to the fire area reviews and are required. Any reviews and documentation of the fire area boundaries should be performed as part of reviews of engineering evaluations, licensing action, or as part of the reviews of the NEI 04-02 Table B-1 process.

Fire Protection Systems and Features Required for Deterministic Compliance

If a fire protection system or feature is required to meet one of the following deterministic compliance strategies, then it is required to meet the nuclear safety performance criteria and therefore its design and qualification shall meet the appropriate sections of NFPA 805 Chapter 3:

1. Fire protection systems and features required for deterministic compliance in accordance with Section 4.2.3 of NFPA 805
2. Required by Existing Engineering Equivalency Evaluation (EEEE)

   As allowed by Section 2.2.7 of NFPA 805, "...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 equivalency evaluations include evaluations previously known as Generic Letter 86-10 evaluations, exemptions, and deviations. Fire Protection systems and features that form the bases for acceptability of these existing compliance strategies are required to meet the nuclear safety performance criteria.

Fire Protection Systems & Features Required for Performance-Based Compliance

Fire Modeling Approach

If a fire protection system or feature is included in the determination of the maximum expected and limiting fire scenarios then it is required by Chapter 4 of NFPA 805 and is then subject to the applicable requirements of NFPA 805 Chapter 3.

Fire Risk Approach

In accordance with NFPA Section 4.2.4.2, the "...use of fire risk evaluation for the performance-based approach shall consist of an integrated assessment of the acceptability of risk, defense-in-depth, and safety margins." If the fire protection system or feature is required to demonstrate the acceptability of risk or defense-in-depth, then it is required by Chapter 4 and is then subject to the applicable requirements of NFPA 805 Chapter 3.. The following method is used to determine if a fire protection feature or system is required for the acceptability of risk or defense-in-depth.

1. Acceptability of Risk

   A fire protection feature may be required for the ‘acceptability of risk’ in one of two ways:

   a. It is explicitly required to reduce risk in the NFPA 805 transition fire risk evaluation (Δ CDF / Δ LERF), or

   b. It is required to reduce the overall fire risk for the plant

2. Defense-in-Depth

In accordance with NFPA 805 Section 2.4.4, Plant Change Evaluation, "...The evaluation process shall consist of an integrated assessment of the acceptability of risk, defense-in-depth, and safety margins." NFPA 805 Section 4.2.4.2 refers to the acceptance criteria in this section. Therefore fire protection systems and features required to demonstrate an adequate balance of defense-in-depth are required by NFPA 805 Chapter 4.

The fire protection systems and features determined to be required should be added to the B-3 Table.

In addition, a summary of the results of this review should be assembled for inclusion as the LAR Table 4-3 – Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features. An example of the presentation of the results of this review is provided in Table B-TBD2 – Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features.

Table B-TBD2 Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Feature

Fire Area	Fire Zone	Description	NFPA 805 Regulatory Basis	Required Suppression System (E, R, D, S)	Required Detection System (E, R, D, S)	Required[3] Fire Protection Feature (E, R, D, S)	Required Fire Protection Feature and System Details
AB		**Auxiliary Building**	**4.2.4.2[4]**				
AB	48	Unit 3 LPI & RB Spray Pumps			R	None	Detection – LPI/HPI areas
AB	49	Unit 3 LPI & RB Spray Pumps			R	None	Detection – LPI/HPI areas
AB	50	Unit 3 HPI Pump Area			R	None	Detection – LPI/HPI areas
ÁB	50A	Unit 3 HPI Pmp, Spt Resin Xfr Pmp Wste Tnk, Wste & CT Dm Pmps			R	None	Detection – LPI/HPI areas

Legend:

E – EEEE/LA Criteria: Systems required for acceptability of Existing Engineering Equivalency Evaluations / NRC approved Exemptions/Deviations (Section 2.2.7)

R – Risk Criteria: Systems required to meet the Risk Criteria for the Performance-Based Approach (Section 4.2.4)

D – DID Criteria: Systems required to maintain adequate balance of Defense-in-Depth for a Performance-Based Approach (Section 4.2.4)

S – Separation Criteria: Systems required for Chapter 4 Separation Criteria in Section 4.2.3

Notes:

1. Refer to B-3 for each area for additional information
2. Modification Required
3. Fire Protection Features in this Table only refer to those features 'installed in the Fire Area that have a corresponding Chapter 3 requirement'