

FAQ Number 06-0005

Plant: Harris Nuclear Plant Submittal Date: 10/26/04

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805 TF FPWG RATF RIRWG BWROG PWROG

Subject: Definition of a Fire Protection Program (FPP) Change

Is this interpretation of current 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):

NEI 04-02 Sections 4.4 and 5.3 require revision to clarify what is considered a fire protection program change.

Circumstances requiring guidance interpretation or new guidance:

This FAQ addresses Parking Lot items #19 and #23

Regulatory Guide 1.205, Risk informed. Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants, section 3.2.6 Cumulative Risk of Changes, states that

“Post-transition risk reductions for plant changes that are not related to the Fire Protection Program (FPP) may be used to offset the risk increases attributable to FPP-related changes in accordance with Section 2.1.2 of RG 1.174, but must be pre-approved by the NRC as required by the standard fire protection license condition. Risk reductions for changes related to the FPP may be used as offsets without pre-approval by the NRC.”

This guidance provides no insight as to what should be considered a FPP-related change or not. Since failure to obtain NRC pre-approval for using risk reductions from a non-FPP related change would be contrary to the guidance in RG 1.205, additional guidance should be provided to clarify what is considered a FPP-related change once NFPA-805 is implemented.

In addition Regulatory Guide Section C.2.2 of RG 1.205 states:

"The baseline FPP risk for the estimate of the net risk change is that for a plant that is fully compliant with the current deterministic regulations for the FPP, including NRC-approved exemptions. The risk increase may be combined with risk decreases associated with retaining or making changes to fire protection features (fire protection systems and procedures relied upon to meet FPP nuclear safety and radioactive release performance criteria) not required by NFPA 805 when estimating the total risk change to be reported in the license amendment request."

This guidance seems to limit fire protection program changes to fire protection systems and procedures. Fire Protection systems and procedures do not represent all aspects of a fire protection program and limiting the evaluation of risk increases/decrease should not be limited strictly to these aspects of a FPP.

In addition, the implementation of an NFPA 805 FPP change process requires that the plant have an acceptable fire PSA in order to use the risk acceptance criteria (Regulatory Guide 1.205 Section 3.1). Changes to the plants internal events PSA and therefore the fire PRA occur for various reasons (e.g., model updates, etc). Not all these changes should be considered fire protection program changes subject to the NEI 04-02 change process. Clarification is required to determine which changes to the fire PSA should be considered a FPP-related change.

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

The areas where agreement is required:

- 1. Regulatory Guide 1.205 requires NRC pre-approval post transition when using risk reductions not related to the FPP. What is included in a Fire Protection Program needs to be clearly defined so that FPP-related changes can be determined.*
- 2. Additionally it needs to be clarified as to what is considered a plant change when using the PSA to determine the importance of FPP-related changes.*
- 3. Whether changes in the fire PSA are considered a FPP-related change.*

Potentially relevant existing FAQ numbers:

None.

Response Section:

Proposed resolution of FAQ and the basis for the proposal:

- 1. A Fire Protection Program post transition consists of the following:
 - a. Fire Protection features and systems required to meet Chapter 3 of NFPA 805 and those required to meet the performance or deterministic requirements of Chapter 4 of NFPA 805. Examples include: fire brigade training and transient combustible**

control programs; the fire detection, suppression, fire barriers and Electrical Raceway Fire Barrier Systems (ERFBS) that are required to meet the performance-based or deterministic requirements of Chapter 4 of NFPA 805.

- b. Success Paths credited to meet the nuclear safety performance criteria (e.g., the specific plant equipment and operating procedures that are credited in the Nuclear Safety Capability Assessment)*

Based on this definition of Fire Protection Program, the following are examples of FPP-related and Non-FPP related changes:

FPP-related changes:

- *Adding a currently installed plant system to the nuclear safety capability analysis in order to gain additional post-fire shutdown capability/reduce fire risk.*
- *Plant security modifications that enhance/degrade installed plant fire barriers.*
- *Adding a new dc panel due to maintenance problems with the existing panel. The new panel provides additional redundancy and reduces reliance on post-fire recovery actions.*

Non-FPP related changes:

- *Plant modifications to reduce seismic risk with no impact on fire protection (additional pipe supports, etc.)*
- *Reducing internal flooding risk by performing detailed calculations and installing additional plant hardware that does not impact fire risk.*
- *Change to SG tube rupture emergency operating procedures that affect SG tube rupture risk*
- *Revised numbers for LOCA frequencies in the internal events model*
- *Revised plant specific data used in the PSA.*

Basis:

These FPP attributes are part of the fire program licensing basis and are identified as such in the NFPA 805 License Amendment Request (LAR). What is not considered as FPP-related is the PSA model itself, which includes the documentation, data elements and associated logic. Additionally any plant equipment or procedures that are used in the fire PSA or the underlying Level I and Level II PSA, but is not specifically included as part of the nuclear safety capability assessment are not considered FPP-related. Some of these plant components or procedures could be used to reduce plant fire risk but are not included in the nuclear safety capability assessment, such as a station blackout diesel or the feed and bleed capability. This provides a defined scope for FPP-related.

2. *The term plant change is defined as a change to the physical plant systems structures or components (SSC) or plant operating, emergency or off-normal procedures, as defined in the 50.59 process.*

Basis:

The changes to SSC that alter the facility or plant operating procedures are subject to 10 CFR 50.59 and thus easily understood as a plant change. With the scope of what is considered a FPP-related change defined, then changes that are not FPP-related, but offset the fire risk increase are also easily understood.

3. *Changes in the fire PSA and the underlying Level I and Level II PSA are not FPP-related changes and also are not considered a plant change.*

Basis:

The PSA itself (data, logic, supporting documentation and analysis) is built to reflect the facility as designed and operated. Thus a change to the PSA itself cannot be a change to the SSC or plant procedures and is not a FPP related change. As an example of potential changes in the fire PSA would be revising an equipment reliability rate or changing the PSA logic for a support system not credited in the nuclear safety performance measure. Plant changes, such as adding an additional high pressure injection pump to the facility, if the Nuclear Safety Capability Assessment will not be revised, as a result of this change, to include this new pump as a success path credited to meet the nuclear safety performance criteria, then it is not considered a Fire Protection Program Change and as such would require the NRC pre-approval per the requirements of RG1.205, if used to offset a FPP-related change with an associated risk increase.

If appropriate, provide proposed rewording of guidance for inclusion in next revision.

See attached changes to Revision 1 of NEI 04-02

5.3 Plant Change Process

5.3.1 Overview

The plant change evaluation is a required step in the methodology for all changes to previously approved fire protection program elements. NFPA 805 Section 2.2.9 states that:

In the event of a change to a previously approved fire protection program element, a risk-informed plant change evaluation shall be performed and the results used as described in 2.4.4 to ensure that the public risk associated with fire-induced nuclear fuel damage accidents is low and the adequate defense-in-depth and safety margins are maintained. [NFPA 805, Section 2.2.9]

Section 2.4.4 of NFPA 805 provides the criteria against which the change evaluations are evaluated. It states that:

A plant change evaluation shall be performed to ensure that a change to a previously approved fire protection program element is acceptable. The evaluation process shall consist of an integrated assessment of acceptability of risk, defense-in-depth, and safety margins. [NFPA 805, Section 2.4.4]

Details regarding the acceptance criteria are provided in Sections 2.4.4.1, 2.4.4.2, and 2.4.4.3 of NFPA 805.

- Section 2.4.4.1 requires the change in public health risk from any plant change be acceptable to the NRC as demonstrated by the change in Core Damage Frequency (CDF) and Large Early Release Frequency (LERF). The NRC already has established acceptable quantitative changes to the CDF and LERF in Regulatory Guide 1.174. Specifically, these criteria should be applied to show that the public health risk associated with fire-induced nuclear fuel damage related to the change is acceptably low.
- Sections 2.4.4.2 and 2.4.4.3 for defense-in-depth and safety margin simply repeat the criterion in Section 2.2.9 requiring the adequate maintenance of these factors. Criteria complying with these requirements also are provided in Regulatory Guide 1.174 and this guidance. Note that sections 2.4.4.2 and 2.4.4.3 also indicate that the deterministic approach for meeting the performance criteria "shall be deemed to satisfy" requirements for defense-in-depth and safety margin.

These Sections of NFPA 805 show, in a general way, that the Plant Change Evaluation is similar to that already required under the traditional regulatory framework. The traditional regulatory framework allows for changes to be made to the plant under processes such as 10 CFR 50.59, fire protection standard license condition, the exemption process under 10 CFR 50.12, or other regulatory processes.

The change process under risk-informed, performance-based regulatory framework requires the explicit consideration of risk. The evaluation of risk is limited to the determination of whether an increase has occurred, and if so, whether the increase is within acceptable limits. A structured screening process can meet the requirements of NFPA 805 for this evaluation of risk. This screening process will be used to 'screen' minimal increases in risk. For potentially higher

Comment [EK1]: This paragraph will be revised under a different FAQ to reflect guidance in Regulatory Guide 1.205.

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risk changes a more comprehensive treatment would be used. The intent of this approach is to provide analysis flexibility to address a wide range of issues and conditions. In general, the Change Evaluation process focuses on performing those Engineering Analyses needed to establish the acceptability of the change. In addition to technical acceptability, a key consideration in the traditional regulatory framework is the need for prior NRC approval. The need for NRC pre-approval is discussed in the acceptance criteria section.

Figure 5.1 depicts the Plant Change Evaluation Process.

The Plant Change Process can be divided into the following subtasks:

- **Defining the Change (See Section 5.3.2)**
- **Preliminary Risk Screening (See Section 5.3.3)**
- **Risk Evaluation (See Section 5.3.4)**
- **Acceptance Criteria (See Section 5.3.5)**

Appendix I contains an example Plant Change Evaluation Form and Appendix J contains additional information regarding the Plant Change Process. The following subsections provide guidelines for performing the Plant Change Process that may be applied to changes to the fire protection program.

Comment [EK2]: Deleted the text regarding NRC approval from this section and inserted in new section

5.3.2 Defining the Change

Bounds of the Fire Protection Program

Post transition Fire Protection Program changes will be evaluated using process defined in this section. To evaluate fire protection program changes first a common understanding of what constitutes a fire protection program change must be reached. For purposes of the change evaluation process the following defines the bounds of the fire protection program:

- Fire Protection features and systems required to meet Chapter 3 of NFPA 805 and those required to meet the performance or deterministic requirements of Chapter 4 of NFPA 805. Examples include: fire brigade training and transient combustible control programs; the fire detection, suppression, fire barriers and Electrical Raceway Fire Barrier Systems (ERFBS) that are required to meet the performance-based or deterministic requirements of Chapter 4 of NFPA 805.
- Success Paths credited to meet the nuclear safety performance criteria (e.g., the specific plant equipment and operating procedures that are credited in the Nuclear Safety Capability Assessment)

Based on this definition of Fire Protection Program, the following are examples of FPP-related and Non-FPP related changes:

- FPP-related changes:
 - Adding a currently installed plant system to the nuclear safety capability analysis in order to gain additional post-fire shutdown capability/reduce fire risk.

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- Plant security modifications that enhance/degrade installed plant fire barriers.
- Adding a new dc panel due to maintenance problems with the existing panel. The new panel provides additional redundancy and reduces reliance on post-fire recovery actions.

- Non-FPP related changes:
 - Plant modifications to reduce seismic risk with no impact on fire protection (additional pipe supports, etc.)
 - Reducing internal flooding risk by performing detailed calculations and installing additional plant hardware that does not impact fire risk.
 - Change to SG tube rupture emergency operating procedures that affect SG tube rupture risk
 - Revised numbers for LOCA frequencies in the internal events model
 - Revised plant specific data used in the PSA.

What is not considered as FPP-related is the PSA model itself, which includes the documentation, data elements and associated logic. Additionally any plant equipment or procedures that are used in the fire PSA or the underlying Level I and Level II PSA, but is not specifically included as part of the nuclear safety capability assessment are not considered FPP-related. The PSA itself (data, logic, supporting documentation and analysis) is built to reflect the facility as designed and operated. Thus a change to the PSA itself cannot be a change to the SSC or plant procedures and is not a FPP related change.

Defining the Change

Plant changes can involve either physical components of the plant or specific details of the fire protection program. The need to perform a Change Evaluation can arise through a number of events or conditions.

1. An in-situ condition (physical or programmatic) could be discovered that is inconsistent with the NFPA 805 Licensing Basis. A Change Evaluation can be performed to determine if the in-situ condition can remain and be treated as an acceptable change to the fire protection program.
2. A plant modification could be proposed that requires altering the fire protection program features in order to implement the modification in a cost-effective manner. A Change Evaluation can be performed to examine a number of proposed alternatives to develop a configuration that provides adequate protection at acceptable cost.
3. A programmatic change in the fire protection program may alter a feature that has been explicitly or implicitly incorporated into the Licensing Basis (pre-transition or NFPA 805 Licensing). A feature that forms the basis for the acceptance of an exemption or deviation (e.g., specific reference to a response by the fire brigade) would represent implicit incorporation into the Licensing Basis. A Change Evaluation is required in this case to determine if this modification is acceptable.

Comment [EK3]: Changed to be consistent with the Regulatory Guide

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4. A change to administrative controls or organization, such as a change to surveillance frequencies.

The Change Evaluation process begins by defining the change or altered condition to be examined and the baseline configuration as defined by the Licensing Basis (CLB pre-transition or NFPA 805 Licensing Basis post-transition)¹.

1. The baseline is defined as that plant condition or configuration that is consistent with the Licensing Basis (CLB pre-transition or NFPA 805 Licensing Basis post-transition).
2. The changed or altered condition or configuration that is not consistent with the Licensing Basis is defined as the proposed alternative.

In some instances, the Change Evaluation focuses on the presence of plant system(s) that would typically have been located in separate fire areas or would have otherwise been provided with features or characteristics that would have minimized their concurrent failure given a postulated fire. The presence of these redundant features creates the potential for a single postulated fire to disable both. As such, combination of targets within the fire area represents the interactions that require evaluation in the Change Evaluation process. These interactions or target set(s) are an important consideration in the Change Evaluation process.

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

¹ In some instances where the existing licensing basis is unclear the 'Deterministic Approach' may form the baseline for the Change Evaluation.

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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 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

NFPA 805 Section 4.1, states that, "Deterministic requirements shall be "deemed to satisfy" the performance criteria and require no further engineering analysis." Chapter 4 of NFPA 805 provides the requirements for the baseline evaluation of the fire protection program's ability to achieve the performance criteria outlined in Section 1.5 of NFPA 805. The 'deemed to satisfy' with out additional engineering analysis does not imply that a Plant Change Evaluation would not be performed. For example if a licensee was changing its current licensing basis in a fire area to a 'deterministic method', that change would require a 'Plant Change Evaluation'. Note the Defense in Depth and Safety Margin portion of the "Plant Change Evaluation" would be satisfied by the fact that a 'deterministic' option was chosen for compliance (See Sections 2.4.4.2 and 2.4.4.3 of NFPA 805).

Completing the cover sheet of the Plant Change Evaluation (Appendix I) and Sections 1, 2 and 3 defines the change being evaluated in terms of the types of evaluations that may be necessary to demonstrate the acceptability of the change.

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5.3.5 Acceptance Criteria

The acceptance criteria for the Plant Change Evaluation consist of two parts. One is quantitatively based and the other is qualitatively based. The quantitative figures of merit are Δ CDF and Δ LERF. The qualitative factors are defense-in-depth and safety margin. If a change meets the acceptance criteria described below, this is confirmation that a success path effectively remains free of fire damage. In addition to technical acceptability, another key consideration is the need for prior NRC approval.

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Comment [EK4]: Note that this section needs to be re-written to address issues Regulatory Guide 1.205 specifically cumulative changes, baseline. A separate FAQ will be written for this.

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5.3.5.6 Changes that require NRC pre-approval

In addition to technical acceptability, a key consideration in the traditional regulatory framework was the need for prior NRC approval. NRC approval is generally not required if the ability to achieve and maintain safe shutdown is not adversely impacted. Under the risk-informed, performance-based regulatory framework, Fire Protection Program changes will be made without prior NRC approval, except where required by:

- Other regulatory processes (i.e., Technical Specifications),
- 10 CFR 50.48(c). Changes to Chapter 3 requirements or Nuclear Safety Changes that do not meet the acceptance criteria of NFPA Section 2.4.4.
- NFPA 805 Section 1.7 Equivalency states that "Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability and safety over those prescribed by this standard. Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency." 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 or if the code does not dictate the specific issue (e.g., adequacy of coverage of suppression and detection systems). In addition to the performance-based methods outlined in NFPA 805, the NRC will provide guidance on Analytical methods and tools and methods acceptable for use in NFPA 805 applications in the Regulatory Guide for the adoption of 10 CFR 50.48. Therefore approval will be required for:

- Changes that have been evaluated using performance-based methods other than the those acceptable to the AHJ
- Changes that have been evaluated using performance-based methods other than the approaches in NFPA 805 (i.e., fire modeling and risk evaluation)

Except as noted, in general changes that have been previously approved by the NRC or that do not deviate from a specific NFPA 805 requirement related to systems, methods, or devices need not be submitted for AHJ approval.

- Regulatory Guide 1.205. Post-transition risk reductions for plant changes that are not related to the FPP may be used to offset risk increases attributable to FPP-related changes in accordance with Section 2.1.2 of RG 1.174, but must be pre-approved by the NRC as required by the standard fire protection license condition. Risk reductions for changes related to the FPP may be used as offsets without pre-approval by the NRC.

Comment [EK5]: 10 CFR 50.59 e 4 specifically excludes fire protection

Comment [EK6]: This is text from the overview section.