

April 15, 2015

MEMORANDUM TO: AFPB File

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SUBJECT: CLOSE-OUT OF NATIONAL FIRE PROTECTION ASSOCIATION
STANDARD (NFPA) 805 FREQUENTLY ASKED QUESTION 12-
0061, NFPA 805 CHANGE PROCESS

The Fire Protection Branch (AFPB) and PRA Licensing Branch (APLA) have reviewed Frequently Asked Question (FAQ) 12-0061, Revision 3, "NFPA 805 Change Process." Some earlier FAQs related to post-transition were developed very early in the pilot plant experience (2006 timeframe). The complexity and importance of the change control process was recognized with the closure of two earlier FAQs (FAQs 06-0004 and 06-0005) without resolution, in order to allow additional lessons to be learned. For these reasons, the information in FAQ 12-0061 is proposed to supersede information in FAQs 06-0002 (NFPA 805 Chapter 4 Questions) and 06-0003 (Changes to Screening Acceptance Criteria). Also, FAQ 12-0061 proposes to eliminate the forms conceived in NEI 04-02, Appendix I. These forms were considered by the NFPA 805 Task Force to be too simplified and not considered to be an effective tool for the licensees.

Enclosure:
Evaluation of FAQ 12-0061

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BACKGROUND

Licensees that have a 10 CFR 50.48(c) compliant fire protection program (FPP) that is implemented through a new, standardized fire protection license condition are allowed to make changes to their fire protection program after transition to NFPA 805. Some of these changes may be made without prior Nuclear Regulatory Commission (NRC) Staff review and approval, while others will require preparation and submission of a License Amendment Request (LAR). This FAQ summarizes an acceptable process for licensees to make changes to the FPP after implementing a 10 CFR 50.48(c) compliant FPP through the standard license condition described in Regulatory Guide (RG) 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants."

PROPOSAL

FAQ 12-0061, Revision 3, "NFPA 805 Change Process," dated June 3, 2013 proposed guidance to help licensees develop and implement a change process that can be used to make changes to the FPP after implementing a 10 CFR 50.48(c) compliant FPP. Although titled "NFPA 805 Change Process," the FAQ also provides guidance on implementing parts of 50.48(c) that are not part of the NFPA 805 Standard. This includes a description of how changes should be made according to 10 CFR 50.48(c)(2)(vii) which, contrary to NFPA 805, permits performance based methods to be used for some minimum design requirements in Chapter 3 of NFPA 805 after review and approval of these methods by the NRC Staff.

The FAQ refers to the change process as a "Fire Protection Change Impact Review." In general, the Fire Protection Change Impact Review process focuses on performing the Engineering Analyses needed to establish the acceptability of the change. Figure 5-1 of the FAQ, "Fire Protection Change Impact Review Process," provides an overview and flow path through each of these steps. The FAQ identifies the "NFPA 805 Change Evaluation Document" as the engineering evaluation document that contains all aspects of the change impact review.

The NRC Staff finds that the process described in the FAQ includes all the issues required to be addressed in a FPP change evaluation as identified in 50.48(c). These include the qualitative and/or quantitative risk evaluation; the evaluation and treatment of cumulative effects of FPP changes; and the technical adequacy of the fire probabilistic risk assessment (FPRA).

NRC STAFF EVALUATION

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 that adequate defense-in-depth and safety margins are maintained.

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

ENCLOSURE

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.

The proposed evaluation process in Figure 5-1 and further described in the FAQ is consistent with NFPA-805 Section 2.2.9 and 2.2.4 in that it identifies changes that need to be evaluated and provides guidance on the required evaluations.

Defining Changes

Section 5.3.2 of the FAQ provides a definition of what constitutes a “change” which requires a change impact review. The FAQ defines a FPP change as a physical plant modification that affects the FPP, a programmatic change that affects the FPP, or an in-situ condition (physical or programmatic) that is not in compliance with the plant’s FPP. The FAQ defines the beginning state as the “plant condition or configuration that is consistent with the [current plant] NFPA 805 Licensing Basis,” and the end state as the “altered condition or configuration that is not consistent with the current plant NFPA 805 Licensing Basis.” The NRC Staff finds that the three types of changes described include all FPP changes that are expected and that the definition of the beginning and the end states are the correct definitions with respect to 1) the plant’s current licensing basis and 2) the change in risk evaluation.

The FAQ clarifies in Section 5.3.1.3 that changes to the fire PRA including PRA model changes unrelated to the FPP, PRA tools, and fire modeling tools are expected. These changes are not FPP changes but are changes that are necessary to support FPP change evaluations that satisfy the requirements in NFPA-805. Guidelines on making these changes are provided in Appendices J.6.1 and J.6.3 of the FAQ. The guidance states that changes to the PRA models should be made to reflect changes to the plant and that such updates are periodically made. The guidance also states that fire PRAs can be changed to incorporate new or improved data or methods. Sections J.6.1 of the FAQ clarifies that updates to the PRA should be characterized as PRA Maintenance or PRA Upgrade and states that requirements and guidance for incorporating such changes is found in RG 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities” [RG 1.200] and ASME/ANS RA-Sa-2009, “Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications” [ASME/ANS Standard]. RG 1.200 and the ASME/ANS Standard provide a general process and framework for characterizing the technical adequacy of a PRA. Section J.6.3 of the FAQ provides additional guidelines which would provide confidence that all new or improved methods used in the fire PRA are acceptable to the NRC. The NRC staff finds that these discussions reference acceptable NRC guidance and explain how to meet NFPA 805 Section 2.4.3.3 which requires that “[T]he PSA¹ approach, methods, and data shall be acceptable to the AHJ.”

¹ Probabilistic Safety Analysis [PSA] and Probabilistic Risk Analysis [PRA] refer to the same evaluation.

Preliminary Risk Screen

10 CFR 50.48(c) requires that a risk-informed plant change evaluation shall be performed for every FPP change. A risk-informed evaluation shall include either a qualitative or quantitative evaluation of the expected change in risk, integrated with an evaluation of the effects of the change on defense-in-depth (DID) and safety margins. The risk estimate associated with some changes may be zero or undefined because the NRC defines risk as core damage frequency (CDF) and large early release frequency (LERF) and some changes will not impact these metrics (e.g., Radioactive Release Performance Criteria). For other changes, no acceptable methodologies exist because the impact of the change on the frequency estimates is undefined or not meaningful to measure (e.g., Fundamental Fire Protection Program and Design Elements). The FAQ identifies several types of changes for which no risk evaluation of each individual change is meaningful, and other types for which a screening or qualitative risk evaluation would be sufficient, as summarized below:

Trivial changes

Those changes that are editorial or that clearly have no adverse impact on the FPP

Minimal changes

Those changes that have an expected change in risk so small or that it cannot be reasonably concluded that fire risk has actually changed.

NFPA 805 Chapter 2 – Methodology/Process changes

Those changes that may affect how the various engineering analyses are performed (nuclear safety analysis, risk evaluation, fire modeling), how the program is monitored and/or how the quality requirements of NFPA 805 are met, but do not otherwise affect the FPP. These changes need to be controlled by the licensee and may be subject to NRC review and approval but not necessarily as part of a plant change evaluation. The guidance in the FAQ directs the licensee to review the NFPA 805 Safety Evaluation for the plant to determine acceptability and the need to obtain NRC approval. Methodology changes may be made to the FPP within the bounds of the license condition.

NFPA 805 Chapter 3 – Fundamental Fire Protection Program and Design Elements

Those changes to Chapter 3 FPP elements for which NFPA-805 specifically permits the licensee to use an engineering evaluation to demonstrate that the change is functionally equivalent to the corresponding technical requirement or to demonstrate the change is acceptable because the alternative is adequate for the hazard. An exception to the NFPA 805 requirements is contained in 10 CFR 50.48(c)(2)(vii) which specifies that a licensee may request NRC approval to use a performance-based method to demonstrate compliance with a NFPA 805 Chapter 3 requirement. Either a qualitative or quantitative risk estimate might be used as part of such a method.

Non-Power Operational (NPO) Modes

Those changes made to the plant response to fires originating in non-power operational modes where the current state of knowledge/practice in the industry is insufficient to develop a useable risk estimate. Licenses should use the same methods and processes that were reviewed in the NFPA 805 Safety Evaluation for the plant or otherwise change

these methods/processes as discussed above for NFPA 805 Chapter 2 –
Methodology/Process changes

Radioactive Release Performance Criteria

Those changes made to the plant FPP as they relate to meeting the radioactive release performance criteria which are unrelated to the risks estimated by the risk evaluation.

Changes to the Fire Modelling Methods/Process

Those changes to the computer codes and assumptions used to model fire induced damage on components. Licensees should use the same methods and processes that were reviewed in the NFPA 805 Safety Evaluation for the plant or otherwise change these methods/processes as discussed above for NFPA 805 Chapter 2 –
Methodology/Process changes.

Several of these types of changes involve changes in methods that may or may not require prior NRC staff approval. The FAQ provides guidance on reviewing the NFPA 805 Safety Evaluation and maintaining the change process within the bounds of the fire protection license condition. When necessary, the FAQ directs licensees to request NRC staff review and approval prior to implementation.

The NRC staff finds that the changes summarized above indicate that a rigorous qualitative or a quantitative risk evaluation of specific changes would provide no additional information about the acceptability of the proposed change and therefore need not be performed. A risk-evaluation consists of an integrated assessment of the acceptability of risk, DID, and safety margins. The FAQ notes that processes to evaluate the DID and safety margin implications of FPP changes must be developed and approved by the NRC staff during the transition to NFPA 805. The FAQ states that these same processes should be used to evaluate all FPP changes, including those that screen out of further risk evaluation based on being identified as any of the above types of changes. The NRC Staff finds that all the changes as described and dispositioned in the FAQ represent changes for which the effect on risk is qualitatively determined to be acceptable and additional review of each specific change is not needed. The RG 1.174 guidance that all risk-informed changes include consideration of the impact of the change on DID and safety margins is met with the guidance in the FAQ.

Risk Evaluation

Changes that cannot be qualitatively evaluated as described as part of the preliminary risk screening require a quantitative risk estimate for the specific change. The FAQ clarifies that a quantitative change in risk estimate should use an acceptable Fire PRA that reflects the as-built, as-operated plant at the time of the estimate. A quantitative change in risk estimate is defined in the FAQ as the difference between the risk of the altered condition or configuration that is not consistent with the NFPA 805 licensing basis and the risk of the compliant condition which is the current condition or configuration that is consistent with NFPA 805. Figure 5-2 of the FAQ, “Compliant versus Changed/Altered Conditions” provides equations and a graphical representation of how to estimate the change in risk for an individual change.

The approach, processes, and the equations are consistent with those performed to support transition to an NFPA 805 licensing basis and therefore are acceptable.

Acceptance Criteria

NFPA 805 Section 2.4.4.1, Risk Acceptance Criteria states, in part,

The change in public health risk from any plant change shall be acceptable to the AHJ. CDF and LERF shall be used to determine the acceptability of the change.

When more than one change is proposed, additional requirements shall apply. If previous changes have increased risk but have met the acceptance criteria, the cumulative effect of those changes shall be evaluated.

RG 1.205 clarifies that some changes may be made by the licensee without submitting a LAR to the NRC for prior review and approval (assuming there are no other regulatory constraints that require a submittal). This authority for self-approval and quantitative acceptance criteria are included in the fire protection license condition issued to each licensee when the licensee receives approval to transition to NFPA 805.

Section 5.3.5 of the FAQ provides the acceptance criteria discussed in RG 1.205 and included in the license condition. The FAQ clarifies that these criteria are to be applied to each individual change consistent with RG 1.205 and the license condition. Consistent with RG1.205, the FAQ clarifies that the cumulative effect of previous changes need only be quantitatively evaluated when a LAR is required. The cumulative effect of self-approved changes has been determined by the NRC to be small and acceptable as described in RG 1.205. The FAQ clarifies that an acceptable impact of the change on DID and safety margins using the methods accepted as part of the original LAR review are also part of a risk-informed evaluation.

If the self-approval acceptance guidelines for CDF and LERF are not met, the FAQ clarifies that the licensee should prepare and submit a LAR consistent with those required of a risk-informed LAR utilizing RG 1.174 as supplemented by RG 1.205. The FAQ identifies several differences between a self-approved change evaluation and an evaluation that must be submitted for NRC Staff review and approval. The first difference is that the larger, RG 1.174 CDF and LERF increase acceptance guidelines are available for the submitted evaluation. A second difference is that multiple, unrelated FPP changes may be combined such that changes that decrease risk can be quantitatively combined in a single submittal with other changes that increase risk and the total change in risk identified as the change in risk. This combining of changes is consistent with RG 1.174 Section 1.1, "Combined Change Requests."

Section J.6.3 of the FAQ clarifies that the third difference between a LAR evaluation and a self-approval evaluation is that a LAR evaluation requires that the cumulative change in risk from all FPP changes after transition must be addressed as required in NFPA-805 Section 2.4.4.1, "Risk Acceptance Criteria." The FAQ identifies two principle features of this cumulative evaluation; 1) the cumulative evaluation is performed against the post-transition baseline risk and 2) the cumulative estimate may be modified and augmented as appropriate by change(s) to the risk profile caused by the PRA maintenance and upgrade process. The FAQ does not provide

additional details on how a cumulative change must or could be developed but the evaluation will be submitted to the NRC for review and approval so additional details need not be included in this guidance document. The NRC staff finds the acceptance guidelines as explained in the FAQ satisfy the rule requirements and are consistent with RG 1.205 guidance and are therefore acceptable.

Conclusion

The proposed additions to NEI 04-02, as presented in FAQ 12-0061, Rev 3, are consistent with the regulation and NFPA 805 as well as the guidance provided in RG 1.205. Therefore, the staff finds the proposed changes to NEI 04-02 to be acceptable.

The staff has reviewed the proposed changes to NEI 04-02, as presented in FAQ 12-0061, Revision 3, and finds that nothing in this FAQ would prevent continued endorsement of NEI 04-02. In accordance with Regulatory Issue Summary 2007-19, the guidance in this FAQ is acceptable for use by licensees post transition. The final endorsement of this FAQ will be addressed by the next revision to RG 1.205.

References:

For details regarding this FAQ, please see the following:

1. FAQ 12-0061, Revision 0, dated July 6, 2012, ADAMS Accession No: ML121910211.
2. NRC Staff response to FAQ 12-0061, Revision 0, ADAMS Accession No: ML122490068.
3. Comment resolution for FAQ 12-0061, Revision 0, ADAMS Accession No: 123180051.
4. FAQ 12-0061, Revision 1, dated November 8, 2012, ADAMS Accession No: ML123180049.
5. FAQ 12-0061, Revision 2, ADAMS Accession No: ML13059A087
6. NRC Staff response to FAQ 12-0061, Revision 2, ADAMS Accession No.: ML13113A276
7. FAQ 12-0061, Revision 3, dated June 3, 2013, ADAMS Accession No: ML13162A106