

March 12, 2009

MEMORANDUM TO: AFPB File

FROM: Alexander Klein, Chief */RA/*
Fire Protection Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: CLOSE-OUT OF NATIONAL FIRE PROTECTION ASSOCIATION
STANDARD (NFPA) 805 FREQUENTLY ASKED QUESTION 06-0008,
FIRE PROTECTION ENGINEERING ANALYSES

The Fire Protection Branch (AFPB) has reviewed Frequently Asked Question (FAQ) 06-0008, Revision 9, "Fire Protection Engineering Analyses." The NFPA 805 transition team at Shearon Harris (the authors) created FAQ 06-0008 to provide guidance to licensees transitioning to a risk-informed, performance-based fire protection program (FPP) in accordance with 10 CFR 50.48(c) and NFPA 805 with regard to the use of Fire Protection Engineering Evaluations (FPEEs). FAQ 06-0008, Revision 9 provides a general description of the FPEE process, the different types of FPEEs that may be used under NFPA 805, when prior NRC approval is needed, and how that approval is to be obtained.

BACKGROUND

Licensees that have a 10 CFR 50.48(b) compliant fire protection program that is implemented through the standard fire protection license condition are allowed to make certain types of minor changes without prior NRC approval as long as the changes do not "adversely affect" the plant's ability to achieve and maintain safe shutdown in the event of a fire. The process used to perform these changes was originally described in Generic Letter 86-10. The methods used in support of this process have been referred to using several different names: Generic Letter 86-10 Evaluation, Fire Protection Engineering Evaluation, Fire Protection Engineering Equivalency Evaluation, etc. For the purposes of this FAQ, the authors propose to call them Fire Protection Engineering Evaluations.

Licensees transitioning to a risk-informed, performance-based FPP in accordance with 10 CFR 50.48(c) and NFPA 805 have found that there is a continuing need to be able to use FPEEs to address minor deviations from the fire protection requirements. However, 10 CFR 50.48(c) does not provide a provision that enables licensees to continue the GL 86-10 process. This FAQ clarifies the licensees' ability to make minor changes to the fire protection program in the absence of the GL 86-10 process.

CONTACT: Harry Barrett, NRR/DRA
301-415-1402

PROPOSAL

The authors of FAQ 06-0008, Revision 9 have proposed that FPEEs be categorized into three types: “functional equivalency evaluations,” “adequate for the hazard evaluations,” and the “bounding analysis approach.” The authors proposed that the first two categories (functional equivalency evaluations and adequate for the hazard evaluations) do not require prior NRC staff approval because the licensees will ensure, using FPEEs, that the minor changes have not affected the functionality or the adequacy for the hazard against set engineering standards relevant to the change. The third category of minor changes will require the licensee to request NRC staff approval in accordance with 10 CFR 50.48(c)(2)(vii), for methods that use a bounding analysis approach. Once NRC approves the methods using the bounding analysis for a licensee, that licensee may use those methods without prior approval by ensuring that plant specific conditions are within the parameters identified in the bounding analysis.

DISCUSSION & NRC STAFF EVALUATION

The authors chose to organize the technical presentation of the FAQ into categories based on the methods to be used in FPEEs. While this is effective to present the argument for use in NEI 04-02, it is not the most efficient treatment with respect to the regulatory requirements. The critical decision related to use of FPEEs is whether or not the licensee may use the evaluation without submitting it to the NRC for prior approval.

When a licensee performs a minor change to a fundamental fire protection program and design element included in NFPA 805 Chapter 3, the need for prior NRC approval depends on the state of compliance to the NFPA 805 Chapter 3 requirement and if the design element is coupled to the analysis performed in accordance with NFPA 805 Chapter 4.

1. Fire Protection Engineering Evaluations that can be Self-Approved by the Licensee

Functional Equivalency

The use of an engineering evaluation to demonstrate that a given minor change situation (component, system, procedure, physical arrangement, etc.) is functionally equivalent to a corresponding technical requirement (e.g., evaluate the acceptability of posting a sign on a fire door without affecting its fire rating by considering the impact of the sign on the tested configuration of the fire door) is an accepted practice in nuclear plant design, operation and maintenance. Specifically in fire protection engineering, this type of analysis has been used extensively inside and outside the nuclear industry in a variety of commercial and industrial applications to evaluate compliance to fire protection codes. To the extent a qualified fire protection engineer has concluded a minor change has not affected the component, system, procedure or physical arrangement functionality using a relevant technical requirement or standard, the licensee continues to meet 10 CFR 50.48(c) and as such, does not require prior NRC approval.

Adequate for the Hazard

Four specific NFPA 805 sections include requirements that are based on the results of the analyses performed under NFPA 805 Chapter 4. The requirements for Fire Alarm and Detection Systems (Section 3.8), Automatic and Manual Water-Based Fire Suppression Systems (Section 3.9), Gaseous Fire Suppression Systems (Section 3.10) and Passive Fire

Protection Features (Section 3.11) are based on the results of the analyses performed in accordance with NFPA 805 Chapter 4, "Determination of Fire Protection Systems and Features."

In Revision 9, the authors also propose to include seven additional sections from NFPA 805 Chapter 3 that are not based on the results of the analyses performed under NFPA 805 chapters 1, 2 and 4. The following paragraph was added in Revision 9:

"In addition, although the following Sections of NFPA 805 do not specifically refer to Chapter 4, they are also conditional upon the results of analyses performed in accordance with NFPA 805 Chapters 1, 2 and 4 to determine the ability to meet the nuclear safety performance criteria. These systems and features are:

- Structural [NFPA 805 Section 3.3.2]
- Interior Finishes [NFPA 805 Section 3.3.3]
- Roofs [NFPA 805 Section 3.3.6]
- Separation of fire pumps by rated fire barriers [NFPA 805 Section 3.5.5]
- Hydrants and hose house spacing [NFPA 805 Section 2.5.15]
- Standpipe and Hose Stations placement [NFPA 805 Section 3.6]
- Fire Extinguishers placement [NFPA 805 Section 3.7]"

The staff does not endorse the addition of these sections of Chapter 3. They are not based on the results of the analyses performed in accordance with NFPA 805 Chapters 1, 2 and 4. These sections provide the requirements for fundamental fire protection program and design elements that require prior staff approval before making changes.

The methodology presented in NFPA 805 Section 2.4 states:

"Engineering analyses is an acceptable means of evaluating a fire protection program against performance criteria. Engineering analyses shall be permitted to be qualitative or quantitative in accordance with Figure 2.4.

The effectiveness of the fire protection features shall be evaluated in relation to their ability to detect, control, suppress, and extinguish a fire and provide passive protection to achieve the performance criteria and not exceed the damage thresholds defined in ...[Section 2.5]... for the plant area being analyzed."

Licensees that have developed an acceptable Fire Protection Program and associated risk assessment in accordance with NRC requirements may be granted self-approval of certain Fire Protection Program changes. Some engineering evaluations use a qualified engineer's informed judgment (informed with respect to a technical requirement or a standard) as the basis for meeting the regulatory requirement. To the extent a qualified fire protection engineer has concluded a minor change has not affected the adequacy for the hazard using a relevant technical requirement, the licensee continues to meet 10 CFR 50.48(c). Therefore, minor changes to the four Chapter 3 elements whose need or capability is governed by licensees' analysis in Chapter 4 that have been successfully evaluated using a FPEE to show that the system or feature remains adequate for the hazard do not need prior NRC approval.

2. Fire Protection Engineering Evaluations Requiring Staff Review and Approval

Bounding Analysis Approach

When a licensee performs a minor change (that is not functionally equivalent) to a fundamental fire protection program and design element included in Chapter 3 that is not related to the analyses performed in accordance with NFPA 805 Chapter 4, prior NRC approval is required for any changes (minor or major). Licensees may use the latitude provided in 10 CFR 50.48(c)(2)(vii) to obtain NRC approval of a method using a bounding analysis approach and upon approval, implement this preapproved method using a FPEE to verify compliance to the bounding conditions.

CONCLUSION

The staff has reviewed the proposed changes to NEI 04-02 as presented in FAQ 06-0008, Revision 9 and, with the exception of the seven NFPA 805 Chapter 3 sections discussed above, finds that nothing in this FAQ would prevent continued endorsement of NEI 04-02. In accordance with RIS 2007-19, the guidance in this FAQ is acceptable for use by licensees in transition. The final endorsement of this FAQ will be addressed by the next revision to Regulatory Guide 1.205.

See the enclosure to this memorandum for a chronological history of this FAQ.

References:

For details regarding this FAQ, please see the following:

- FAQ 06-0008, Revision 0 (09/20/06) (ADAMS accession number ML062860250)
- NRC Staff Response to FAQ 06-0008, Revision 0, (11/27/2006) (ADAMS accession number ML063350442)
- FAQ 06-0008, Revision 1 (02/07) (ADAMS accession number ML070510499)
- NRC Staff Response to FAQ 06-0008, Revision 1 (03/02/07) (ADAMS accession number ML070640544)
- FAQ 06-0008, Revision 2 (02/15/07) (ADAMS accession number ML07080007)
- FAQ 06-0008, Revision 3 (03/30/07) (ADAMS accession number ML071020160)
- NRC Staff Response to FAQ 06-0008, Revision 3 (04/02/07) (ADAMS accession number ML071380177)
- FAQ 06-0008, Revision 4 (04/09/07) (ADAMS accession number ML071380229)
- NRC Staff Response to FAQ 06-0008, Revision 4 (04/26/07) (ADAMS accession number ML071380182)
- FAQ 06-0008, Revision 5 (05/02/07) (ADAMS accession number ML071340180)
- NRC Staff Response to FAQ 06-0008, Revision 5 (07/19/2007) (ADAMS accession number ML072050214)
- FAQ 06-0008, Revision 6 (07/27/07) (ADAMS accession number ML072400065)

- NRC Staff Response to FAQ 06-0008, Revision 6 (09/27/07) (ADAMS accession number ML072740231)
- FAQ 06-0008, Revision 7 (10/09/07) (ADAMS accession number ML072820016)
- NRC Staff Response to FAQ 06-0008, Revision 7 (11/29/07) (ADAMS accession number ML073370775)
- FAQ 06-0008, Revision 8 (12/3/07) (ADAMS accession number ML073370025)
- FAQ 06-0008, Revision 9 (02/19/09) (ADAMS accession number ML090560170)
- NEI 04-02, Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c), Revision 1, (ADAMS accession number ML052590476)
- NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition (available for viewing through the Public Document Room or purchase through NFPA)

Enclosure:

1. Frequently Asked Question 06-0008 History

- FAQ 06-0008, Revision 6 (07/27/07) (ADAMS accession number ML072400065)
- NRC Staff Response to FAQ 06-0008, Revision 6 (09/27/07) (ADAMS accession number ML072740231)
- FAQ 06-0008, Revision 7 (10/09/07) (ADAMS accession number ML072820016)
- NRC Staff Response to FAQ 06-0008, Revision 7 (11/29/07) (ADAMS accession number ML073370775)
- FAQ 06-0008, Revision 8 (12/3/07) (ADAMS accession number ML073370025)
- FAQ 06-0008, Revision 9 (02/19/08) (ADAMS accession number ML0090560170)
- NEI 04-02, Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c), Revision 1, (ADAMS accession number ML052590476)
- NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition (available for viewing through the Public Document Room or purchase through NFPA)

Enclosure:

1. Frequently Asked Question 06-0008 History

Distribution: AFPB R/F AKlein SLaur PLain CMoulton

ADAMS Accession No.: ML073380976

OFFICE	NRR/DRA/AFPB	NRR/DRA	NRR/DRA/AFPB	OGC
NAME	HBarrett	SLaur	AKlein	BJones
Date	03/06/09	03/10/09	03/10/09	03/12/09

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FAQ 06-0008 History

FAQ 06-0008, Revision 0, NEI Initial Proposal, dated 9/26/06

The initial FAQ 06-0008 proposal was developed by NEI to provide a means of implementing performance-based Fire Protection Engineering Evaluations on selected NFPA 805 attributes post-transition. The document presented an overview of the issue, a significant number of document references, a table presenting the various types of engineering analyses, a proposed resolution approach, and an engineering report that outlined methods for performance-based engineering evaluations. The intent of the FAQ was to provide a multi-step process to obtain NRC approval to use performance-based methods on NFPA 805 Chapter 3 requirements. The mechanisms cited in the proposed FAQ was through 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4).

NRC Staff Response to FAQ 06-0008, Revision 0, dated 11/27/06

The NRC staff commented on the structure of the FAQ in that there appeared to be two different types of requests. Evaluations of requirements not specifically spelled out in Chapter 3, (e.g. separation and intervening combustibles), and deviations from applicable NFPA 805 Chapter 3 codes. The NRC staff requested that the FAQ be revised to discuss the issues separately rather than be intermingled throughout the document. In addition, the NRC staff found that there were numerous inconsistencies between the FAQ text, the sections to be included in NEI 04-02, and the technical report. The NRC staff requested that the FAQ be revised to add clarity and resubmitted.

FAQ 06-0008, Revision 1, dated 02/07

Revision 1 was developed to simplify the process presented in the FAQ. This FAQ revision focused on how to develop the issue for presentation in the NFPA 805 License Amendment Request. Two tables of information were provided to indicate how specific requirements in 10 CFR 50.48(c)(2)(vii) and 10 CFR 50.48(c)(4) would be met through implementation of the FAQ method. The detailed information presented in the Appendix on how to perform a fire protection engineering evaluation was removed and a reference to Nuclear Energy Institute document NEI 02-03, "Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program" was added.

NRC Staff Response to FAQ 06-0008, Revision 1, dated 3/02/07

In response to Revision 1, the NRC staff proposed a new approach to be used in implementing the FAQ. The NRC staff proposal was based on the limitation that fire protection engineering evaluations could only be performed on attributes required by NFPA 805 Chapter 3 as long as those changes only affect the referenced codes, standards and listings. Under this proposal, the NFPA 805 change evaluation process would be used to ensure that nuclear safety performance goals, objectives and criteria are satisfied along with defense-in-depth and safety margins, as described in *10 CFR Part 50.48(c)(2)(vii)*.

Enclosure

FAQ 06-0008, Revision 2, dated 2/15/07

NEI responded with a revised FAQ that included the NRC staff proposal. Included in the revision was a table of applicability for each section of NFPA 805 Chapter 3. It also included a Process and Example section to better define how to implement the methodology presented in the FAQ. The NRC staff discussed this proposed revision with the NEI NFPA 805 Task Force during the March 2007 FAQ public meeting held on March 22, 2007.

FAQ 06-0008, Revision 3, dated 3/30/07

Based on feedback from the NRC staff, NEI revised FAQ 06-0008 to address the verbal comments. The revised FAQ proposed additional wording to be added to the standard license condition allowing fire protection engineering evaluations on fire protection program attributes implemented through referenced codes, standards and listings. This revision also included additional wording in the standard license condition allowing fire protection engineering evaluations on fire protection program attributes that are conditional based on the NFPA 805 Chapter 4 requirements.

NRC Staff Response to FAQ 06-0008, Revision 3, dated 4/02/07

In addition to some minor editorial comments, the NRC staff also had a concern with the stated approach presented in the second table with regard to timing of the approval of a revised NEI 04-02 document and its subsequent endorsement in Regulatory Guide 1.205. The NRC staff recommended that the FAQ be revised to state the process being proposed was not an alternative method since it was using the change evaluation process already defined in NFPA 805 with the limitations that it will only be applied through referenced codes, standards and listings.

FAQ 06-0008, Revision 4, dated 4/09/07

NEI revised the document to state that the proposed process was not an alternative method in accordance with 10 CFR 50.48(c)(4). Also, this revision deleted all references to changes to Chapter 3 requirements if allowed by the code of record since these will be enveloped by the process contained in the FAQ.

NRC Staff Response to FAQ 06-0008, Revision 4, dated 4/26/07

The NRC staff took issue with the description of the FAQ implementation process in that the words "approved by the NRC in closure memo dated [TBD]..." implied that NRC was "approving" the process in the FAQ. The NRC staff requested that NEI include a placeholder for the FAQ implementation process to be documented in a Regulatory Issue Summary.

FAQ 06-0008, Revision 5, dated 5/02/07

NEI revised the document to include the recommended placeholder for the NRC FAQ process.

NRC Staff Response to FAQ 06-0008, Revision 5, dated 7/19/07

In addition to numerous editorial and minor comments, the NRC staff took exception to the blanket approval for changes to NFPA 805 Chapter 3 attributes that are conditional based on NFPA 805 Chapter 4 analyses. As the information was presented in the draft FAQ, there was no limit or bounds on how this was to be implemented. Also, based on the fact that the process in the FAQ was not an alternative method, the second table in the body of the FAQ was not needed (the table documented how the requirements of 10 CFR 50.48(c)(4) would be met).

The NRC staff provided a marked up version of the FAQ with recommended editorial and technical changes. The FAQ was discussed with the NEI NFPA 805 Task Force during the July 2007 FAQ public meeting. In that meeting it was decided that there was no need for the blanket approval for changes to NFPA 805 Chapter 3 attributes that are conditional based on NFPA 805 Chapter 4 analyses since performance-based methods are allowed under NFPA 805 Chapter 4. The NRC staff recommended that NEI include a paragraph in the FAQ that stated that for Chapter 3 attributes conditional on Chapter 4 analyses, performance-based methods are acceptable.

FAQ 06-0008, Revision 6, dated 7/27/07

NEI revised FAQ 06-0008 to include the editorial changes recommended as well as the paragraph on Chapter 3 attributes conditional on Chapter 4 analyses. NEI also made several minor changes to the table that documents the applicability of the process to each of the NFPA 805 Chapter 3 paragraphs.

NRC Response to FAQ 06-0008, Revision 6, dated 9/27/07

NEI had included NRC Generic Letter 86-10, Supplement 1 in the table as a referenced code, standard or listing. The NRC staff pointed out that an NRC Generic Letter is not subject to change or interpretation through the process documented in the FAQ. NEI had also included reference to NFPA 805 section 3.3.5.3 dealing with flame propagation testing. The NRC staff pointed out that flame propagation testing had been covered by another FAQ; issues pertaining to flame propagation testing should be handled under the process identified in that FAQ. The NRC staff also made one minor editorial comment.

FAQ 06-0008, Revision 7, dated 10/09/07

NEI revised the FAQ note regarding NRC Generic Letter 86-10, Supplement 1 indicating that although it is not a code, standard or listing, performance based methods can be used to determine the performance requirements for the fire barriers. NEI also added a note to indicate that flame propagation testing had been addressed by FAQ 22. The editorial comment was also incorporated.

Enclosure

NRC Response to FAQ 06-0008, Revision 7, dated 11/29/07

The staff pointed out several additional editorial comments as well as two placeholders for information that did not need to be included in the FAQ.

FAQ 06-0008, Revision 8, dated 12/03/07

NEI revised the FAQ to address the editorial comments.

NRC Response to FAQ 06-0008, Revision 8, dated 1/30/08

NRC stated that the approach provided in the FAQ does not meet the intent of the regulation in that the proposed process requests approval for the ability to self-approve NFPA 805 Chapter 3 deviations using performance-based methods, which is specifically prohibited by 10 CFR 50.48(c)(2)(vii).

FAQ 06-0008, Revision 9, dated 02/19/08

NEI revised the FAQ to present three categories of FPEEs, fundamental equivalency evaluations, adequate for the hazard evaluations and bounding analysis approach.