DRAFT

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. XX-XXX TO [RENEWED] FACILITY OPERATING LICENSE NO. NPF- XX

TRANSITION TO A RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION PROGRAM IN ACCORDANCE WITH 10 CFR 50.48(c)

LICENSEE NAME

PLANT NAME, UNIT X

DOCKET NO. XX-XXX

TABLE OF CONTENTS

NOTE TO REVIEWER:
In general, highlighted text represents text that should be replaced with plant-specific information, or text that provides direction for the reviewer. A final safety evaluation will not include highlighted text.

In this document, several short-hand notations are used, as follows:
FULL PLANT NAME (e.g. Springfield Nuclear Station)
PLANT (e.g. SNS)
FULL LICENSEE NAME (e.g. Springfield Power Utility)
LICENSEE (e.g. SPU)

It may be necessary to refer to the content of information submitted under a request for additional information (RAI) to capture the technical basis of the regulatory evaluation for a particular section. If that is the case, reference the letter which contains the pertinent technical information and include the RAI identification number. Describe the issue and provide an evaluation of the licensee response to the RAI.

ABBREVIATIONS

[customize this list of acronyms to the plant-specific LAR]

ac	alternating current
ADAMS	Agencywide Document Access and Management System
AFW	auxiliary feedwater
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARP	auxiliary relay panel
ASD	alternative shutdown
ASME	American Society of Mechanical Engineers
CCW	component cooling water
CDF	core damage frequency
CFR	*Code of Federal Regulations*
CSIP	charging/safety injection pump
CRS	control room supervisor
DC	direct current
DID	defense-in-depth
EC	engineering change
EEEE	existing engineering equivalency evaluations
ERFBS	electrical raceway fire barrier system
ESFAS	engineered safety features actuation system
F&O(s)	facts and observations
FACP	fire alarm control panel
FAQ	frequently asked question
FR	Federal Register
FPP	fire protection program
FPRA	fire probabilistic risk assessment
FSAR	final safety analysis report
GDC	general design criteria
GL	generic letter
gpm	gallons per minute
HEAF	high energy arcing faults
HGL	hot gas layer
HRE	high(er) risk evolution(s)
IN	information notice
KSF	key safety function
LAR	license amendment request
LERF	large early release frequency
MCB	main control board
MCC	motor control center
MCR	main control room
MSO	multiple spurious operation
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPO	non-power operation
NRC	U.S. Nuclear Regulatory Commission
OMA	Operator manual action
PB	performance-based

PCS	primary control station
PIC	process instrumentation cabinet
PMG	performance monitoring group
POS	plant operational state
PORV	power-operated relief valve
PRA	probabilistic risk assessment
PSA	probabilistic safety assessment
QA	quality assurance
RA	recovery action
RAB	reactor auxiliary building
RAI	request for additional information
RCP	reactor coolant pump
RCS	reactor coolant system
RG	regulatory guide
RHR	residual heat removal
RI	risk-informed
RI/PB	risk informed, performance based
RIS	regulatory issue summary
RWST	refueling water storage tank
SE	safety evaluation
SSC	systems, structures, and components
SSPS	solid state protection system
T-H	thermal-hydraulic
TS	technical specifications
UFSAR	updated final safety analysis report
V&V	verification and validation
VAC	volts alternating current
VCT	volume control tank
VEWFDS	very early warning fire detection system
VFDR	variance from deterministic requirements
ZOI	zone of influence

1.0 INTRODUCTION

1.1 Background

On June 16, 2004, the U.S. Nuclear Regulatory Commission (NRC or the Commission) revised Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," to include Paragraph 50.48(c). Section 48, "Fire protection," Paragraph 50.48(c), "National Fire Protection Association Standard NFPA 805," incorporates by reference NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition (Reference X), hereafter referred to as NFPA 805. This change to the NRC's fire protection regulations provides licensees with the opportunity to adopt a performance-based fire protection program (FPP) as an alternative to the existing prescriptive, deterministic fire protection regulations. Specifically, NFPA 805 allows the use of performance-based methods, such as fire modeling and fire risk evaluations~~risk-informed methods such as fire probabilistic risk assessment~~, to demonstrate compliance with the nuclear safety performance criteria.

Accordingly, LICENSEE NAME, (LICENSEE ACRONYM or the licensee), requested a license amendment to allow the licensee to maintain the PLANT, Unit X (PLANT ACRONYM), fire protection program in accordance with 10 CFR 50.48(c).In the related license amendment request (LAR) and this safety evaluation (SE), extensive reference is made to NFPA 805. In particular, when this SE refers to a FPP element as being in compliance with, or meeting the requirements of, NFPA 805, the NRC staff intends this to indicate that the element is in compliance with 10 CFR 50.48(c) as well as the applicable portions of NFPA 805.

1.2 Requested Licensing Action

LICENSEE submitted its application for transition to NFPA 805 by letter dated MONTH DAY, YEAR (Reference X), which requested to change the [*if needed:* renewed] operating license and technical specifications (TSs) for PLANT in order to adopt a new FPP. The licensee supplemented the application by letter dated MONTH DAY, YEAR (Reference X). The supplement provided additional information that clarified the application, but did not expand the overall scope of the application as originally noticed, and did not change the staff's original proposed opportunity for a hearing on the initial application as published in the Federal Register on XXXX, XX 20XX ((XX FRXXXX).

The licensee requested an amendment to the PLANT [*if needed:* renewed] operating license and TSs to establish and maintain a performance-based fire protection program (RI/PB FPP) in accordance with the requirements of 10 CFR 50.48(c). Specifically, the licensee requested to transition from the existing deterministic fire protection licensing basis established in accordance with *[describe the licensing basis for the plant]* to a performance-based FPP in accordance with 10 CFR 50.48(c), that uses risk information, in part, to demonstrate compliance with the fire protection and nuclear safety goals, objectives, and performance criteria of NFPA 805. As such, the proposed fire protection program at PLANT is referred to as risk-informed, performance-based (RI/PB) throughout this safety evaluation.

The licensee proposed a new fire protection license condition reflecting the new RI/PB FPP licensing basis, as well as revisions to the Technical Specifications that address this change to the current fire protection program licensing basis. Section 2.4.2 and Section 4.0 of this safety evaluation discuss in detail the license condition, and Section 2.4.3 discusses the TS changes.

As part of the implementation of the RI/PB FPP in conformance with NFPA 805, the licensee is subsequently resolving several technical and regulatory issues associated with [*describe any site-specific technical &/or regulatory issues for the plant that bears detailed discussion later in the SE*].

2.0 REGULATORY EVALUATION

Section 50.48, "Fire Protection," of 10 CFR provides the NRC requirements for nuclear power plant fire protection. Paragraph 50.48(c) of 10 CFR outlines the NRC requirements applicable to licensees that choose to adopt a RI/PB FPP (i.e., NPFA 805) as an alternative to meeting the requirements of 10 CFR 50.48(b) (i.e., conformance with Appendix R to 10 CFR Part 50) for plants licensed to operate before January 1, 1979, or the approved fire protection license conditions for plants licensed to operate after January 1, 1979.

The NRC regulations include specific procedural requirements for implementing a RI/PB FPP based on the provisions of NFPA 805. In particular, 10 CFR 50.48(c)(3)(i) requires licensees which choose to adopt a RI/PB FPP in compliance with NFPA 805 to submit a LAR to the NRC that identifies any orders and license conditions that must be revised or superseded, and contains any necessary revisions to the plant's TSs and the bases thereof.

Paragraph 50.48(c)(3)(i) of 10 CFR states that "a licensee may maintain a fire protection program that complies with NFPA 805 as an alternative to complying with paragraph (b) of this section for plants licensed to operate before January 1979, or the fire protection license conditions for plants licensed to operate after January 1, 1979." PLANT was licensed to operate *[describe the licensing basis/date]* and the license condition issued with this safety evaluation will supersede the current fire protection license condition with a condition that allows implementation of a FPP in accordance with NFPA 805.

In addition, 10 CFR 50.48(c)(3)(ii) states that "the licensee shall complete its implementation of the methodology in Chapter 2 of NFPA 805 (including all required evaluations and analyses) and, upon completion, modify the fire protection plan required by paragraph (a) of this section to reflect the licensee's decision to comply with NFPA 805, before changing its fire protection program or nuclear power plant as permitted by NFPA 805."

The intent of this paragraph is given in the statement of considerations for the final rule, which was published in the *Federal Register* (FR) on June 16, 2004 (69 FR 33536). The statement of considerations states:

> This paragraph requires licensees to complete all of the Chapter 2 methodology (including evaluations and analyses) and to modify their fire protection plan before making changes to the fire protection program or to the plant configuration. This process ensures that the transition to an NFPA 805 configuration is conducted in a complete, controlled, integrated, and organized manner. This requirement also precludes licensees from implementing NFPA 805 on a partial or selective basis (e.g., in some fire areas and not others, or truncating the methodology within a given fire area).
>
> The evaluations and analyses process in Chapter 2 of NFPA 805 provides for the establishment of the fundamental fire protection program, identification of fire area boundaries and fire hazards, determination by analysis that the plant design satisfies the performance criteria, identification of the structures, systems and

components (SSCs) required to achieve the performance criteria, conduct of plant change evaluations, establishment of a monitoring program, development of documentation, and configuration control. Chapter 2 of NFPA 805 also provides for the use of a deterministic or performance-based approach to determine that the performance criteria are satisfied and provides for the use of tools such as engineering analyses, fire models, nuclear safety capability assessments, and fire risk evaluations to support development of these approaches. The methodology for the use of these tools is established in Chapter 4 of NFPA 805 (69 FR 33548).

In its LAR, the licensee provided a description of the revised fire protection plan it requests NRC approval to implement, a description of the fire protection program that it will implement under 10 CFR 50.48(a) and (c), and the results of the evaluations and analyses required by NFPA 805. This safety evaluation documents the NRC staff's evaluation of the licensee's amendment request and concludes that:

(1) The licensee identified any orders and license conditions that must be revised or superseded, and provided the necessary revisions to the plant's technical specifications and bases, as required by 10 CFR 50.48(c)(i). The NRC staff finds this adequate.

(2) The licensee completed its implementation of the methodology in Chapter 2, "Methodolgy," of NPFA 805, including completion of all the required evaluations and analyses outlined by the statement of considerations, and the NRC staff has approved the licensee's modified fire protection plan, which reflects the decision to comply with NFPA 805, consistent with 10 CFR 50.48(c)(3)(ii).

Since items (1) and (2) satisfy the requirements of 10 CFR 50.48(c)(3), the staff concludes that the licensee's implementation of the modified fire protection program that aligns with NFPA 805, including physical plant modifications as described in the LAR, in accordance with the implementation schedule set forth in this safety evaluation and the accompanying license condition, is sufficient to demonstrate compliance with 10 CFR 50.48(c).

~~(3) The licensee will modify its fire protection program, as described in the LAR, in accordance with the implementation schedule set forth in this safety evaluation and the accompanying license condition, as required by 10 CFR 50.48(c)(3)(ii).~~

The regulations also allow for flexibility that was not originally included in the NFPA 805 standard. Licensees that choose to adopt 10 CFR 50.48(c), but wish to use the performance-based methods permitted elsewhere in the standard to meet the fire protection requirements of NFPA 805 Chapter 3, "Fundamental Fire Protection Program and Design Elements," may do so by submitting a LAR in accordance with 10 CFR 50.48(c)(2)(vii). Alternatively, licensees may choose to use risk-informed or performance-based alternatives to comply with NFPA 805 by submitting a LAR in accordance with 10 CFR 50.48(c)(4).

In addition to the conditions outlined by the rule that require licensees to submit a LAR for NRC review and approval in order to adopt a RI/PB FPP, licensees may also submit additional elements of their FPP for which they wish to receive specific NRC review and approval, as set forth in Regulatory Guide (RG) 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, Regulatory Position C.2.2.1 issued on December 18, 2009 (74 FR 67253; Reference X). Inclusion of these elements in the NFPA 805 LAR is meant to alleviate uncertainty in portions of the current fire protection program licensing bases as a result of the lack of specific NRC approval of these elements. However, any

submittal addressing these additional fire protection program elements should include sufficient detail to allow the NRC staff to assess whether the licensee's treatment of these elements meets the 10 CFR 50.48(c) requirements

The purpose of the FPP established by NFPA 805 is to provide assurance, through a defense-in-depth (DID) philosophy, that the NRC's fire protection objectives are satisfied.

NFPA 805 Section 1.2, "Defense-in-Depth," states the following:

> Protecting the safety of the public, the environment, and plant personnel from a plant fire and its potential effect on safe reactor operations is paramount to this standard. The fire protection standard shall be based on the concept of defense-in-depth. Defense-in-depth shall be achieved when an adequate balance of each of the following elements is provided:
>
> (1) Preventing fires from starting;
>
> (2) Rapidly detecting and controlling and extinguishing promptly those fires that do occur, thereby limiting fire damage
>
> (3) Providing an adequate level of fire protection for SSCs important to safety, so that a fire that is not promptly extinguished will not prevent essential plant safety functions from being performed

In addition, in accordance with General Design Criterion (GDC) 3, "Fire protection," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, fire protection systems must be designed such that their failure or inadvertent operation does not significantly impair the ability of the SSCs important to safety to perform their intended safety functions.

2.1. Applicable Regulations

The licensee's FPP will generally be considered acceptable if it meets the applicable regulatory criteria established by the following regulations:

- 10 CFR Part 50, Appendix A, GDC 3, "Fire protection," establishes the general criteria for fire and explosion protection of SSCs important to safety.

- 10 CFR Part 50, Appendix A, GDC 5, "Sharing of Systems, Structures, and Components" relates to shared fire protection systems and potential fire impacts on shared SSCs important to safety.

- 10 CFR 50.48(a), requires that each operating nuclear power plant have a fire protection plan that meets the requirements of GDC 3.

- 10 CFR 50.48(c), incorporates NFPA 805 (2001 Edition) by reference, with certain exceptions, modifications and supplementation. This regulation establishes the requirements for using a performance-based FPP in conformance with NFPA 805 as an alternative to the requirements associated with 10 CFR 50.48(b) and Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to 10 CFR Part 50, or the specific plant license condition(s) related to fire protection.

Because NFPA 805 was incorporated by reference into 10 CFR, all requirements of the endorsed standard must be met, unless otherwise excepted by the NRC.

- 10 CFR Part 20, "Standards for Protection against Radiation," establishes the radiation protection limits used as NFPA 805 radioactive release performance criteria, as specified in NFPA 805, Section 1.5.2, "Radioactive Release Performance Criteria."

2.2. Applicable Staff Guidance

The NRC staff review also relied on the following additional staff guidance:

- RG 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, issued December 2009 (Reference X), which provides guidance to licensees for implementing a RI/PB FPP in compliance with 10 CFR 50.48(c).

- RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 1, issued November 2002 (Reference X) which provides guidance to licensees on acceptability limits for risk-informed changes to the licensing basis.

- RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," Revision 2, issued March 2009 (Reference X) which provides guidance to licensees on methods for determining the technical adequacy of probabilistic risk assessment (PRA) results when used for risk-informed changes to the licensing basis.

- RG 1.189, "Fire Protection for Operating Nuclear Power Plants," Revision 2, issued October 2009 (Reference X) which provides guidance to licensees on the proper content and quality of engineering equivalency evaluations used to support the FPP.

- NUREG 0800, Section 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection Program," Revision 0, issued December 2009 (Reference X), which provides the NRC staff with guidance for evaluating LARs that seek to implement a RI/PB FPP in accordance with 10 CFR 50.48(c).

- NUREG-0800, Section 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," Revision 2, issued June 2007 (Reference X) which provides the NRC staff with guidance for evaluating the technical adequacy of a licensee's PRA results when used to request risk-informed changes to the licensing basis.

- NUREG 0800, Section19.2, "Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance," Revision 0, issued June 2007 (Reference X), which provides the NRC staff with guidance for evaluating the risk information used by a licensee to support permanent, risk-informed changes to the licensing basis for the plant.

2.3. Interim Staff Positions (NFPA 805 Frequently Asked Questions Process)

The NRC staff, industry, and other interested stakeholders gain experience and develop lessons learned during the submission and subsequent review of each license amendment request to transition a licensee to a RI/PB FPP. The lessons learned are often converted into interim staff positions, which apply to the ongoing review until they can be formally incorporated into the NFPA 805 guidance documents such as the Nuclear Energy Institute (NEI) document NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)" (Reference X) as endorsed, and RG 1.205. The lessons learned and interim staff positions address the NRC's performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence.

The lessons learned and interim staff positions address the NRC's performance goals of maintaining safety, improving effectiveness and efficiency, reducing regulatory burden, and increasing public confidence. In most cases, the meetings and other interactions involved in promulgating interim staff positions are open to the public and feedback is welcomed. With respect to the NFPA 805 LARs, the NRC established the frequently asked questions (FAQ) process as described in Regulatory Information Summary (RIS) 2007-19, "Process for Communicating Clarifications of Staff Positions Provided in Regulatory Guide 1.205 Concerning Issues Identified during the Pilot Application of National Fire Protection Association Standard 805" (Reference X), to clarify issues encountered during the pilot transition process.

The FAQ process provides a means for the NRC staff to establish and communicate interim positions on technical and regulatory issues that emerge as experience is gained during the review of the NFPA 805 LARs. Approved interim staff positions documented through the FAQ process are used where applicable in reviewing those portions of the LAR to which they apply.

The following table provides the current set of FAQs the NRC staff used in the preparation of this SE, as well as the SE section to which the FAQ was applied. *[Only include those FAQ's that were used in the site-specific LAR]*

Table 2.3-1: Applicable NFPA 805 Frequently Asked Questions

FAQ #	Rev.	FAQ Title	Closure Memo ML #	SE Section
06-0008	9	Fire Protection Engineering Evaluations	ML073380976	
06-0022	2	Acceptable Electrical Cable Construction Tests	ML091240278	
07-0032	2	10 CFR 50.48(a) and GDC Clarification	ML081400292	
07-0035	1	Bus Duct Counting Guidance for High Energy Arcing Faults (HEAF)	ML091620572	
07-0039	2	Provide Update for NEI 04-02 B-2	ML091320068	
07-0040	4	Non-Power Operations Clarification	ML082200528	
08-0042	0	Fire Propagation from Electrical Cabinets	ML092110537	
08-0046	0	Incipient Fire Detection Systems	ML093220426	
08-0047	1	Spurious Operation Probability	ML082950750	
08-0052	0	Transient Fire Size	ML092120501	

2.4. Orders, License Conditions and Technical Specifications

Paragraph 50.48(c)(3)(i) of 10 CFR states that the LAR "must identify any orders and license conditions that must be revised or superseded, and contain any necessary revisions to the plant's technical specifications and the bases thereof."

~~Section 2.4.1 of this SE provides the results of the staff review of the orders that are revised or superseded.~~

~~Section 2.4.2 of this SE provides the results of the staff review of the license conditions that are revised or superseded.~~

~~Section 2.4.3 of this SE provides the results of the staff review of the adequacy of revisions to the PLANT technical specifications.~~

~~Section 2.4.4 of this SE contains the NRC staff's discussion regarding the proposed UFSAR as part of the implementation of the RI/PB FPP.~~

~~Section 2.5 of this SE provides the NRC staff's review of the exemptions that are superseded by the RI/PB FPP licensing basis.~~

~~Section 2.6 of this SE provides the NRC staff's review of the proposed self approval process for RI/PB FPP changes.~~

~~Section 2.7 of this SE provides the NRC staff's review of the licensee's implementation of the RI/PB FPP.~~

~~Section 2.8 of this SE provides a compilation of the confirmatory items identified by the staff during the review process.~~

2.4.1. Orders

The NRC staff reviewed Section 5.2.3, "Orders and Exemptions" and Attachment O, "Orders and Exemptions" of PLANT's NFPA 805 License Amendment Request Transition Report, dated

MONTH DAY, YEAR,(Reference X), hereafter referred to simply as the LAR, with regard to NRC-issued Orders pertinent to PLANT that are being revised or superseded by the NFPA 805 transition process. The licensee determined that no Orders need to be superseded or revised to implement a FPP at PLANT that complies with 10 CFR 50.48(c).

This review, conducted by the licensee, included *[describe the steps taken by the licensee to identify relevant Orders. For example: an assessment of docketed correspondence files and electronic searches, including the NRC's Agencywide Document Access and Management System (ADAMS)]*. The review was performed to ensure that compliance with the physical protection requirements, security orders, and adherence to commitments applicable to PLANT are maintained. The NRC staff accepts the licensee's determination that no Orders need to be superseded or revised to implement NFPA 805 at PLANT.

In addition, a specific review was performed of the license amendment that incorporated the mitigation strategies required by Section B.5.b of Commission Order EA-02-026 (Reference X) to ensure that any changes being made in order to comply with 10 CFR 50.48(c) do not invalidate existing commitments applicable to PLANT.

The licensee's review of this Order and the related license amendment demonstrated that changes to the fire protection program during transition to NFPA 805 will not affect the mitigation measures required by Section B.5.b. The NRC staff accepts the licensee's determination in regard to Section B.5.b of Order EA-02-026.

2.4.2. License Conditions

The NRC staff reviewed LAR Section 5.2.1, "License Condition Changes," and Attachment M, "License Condition Changes," regarding changes the licensee seeks to make to the PLANT fire protection license condition in order to adopt NFPA 805, as required by 10 CFR 50.48(c)(3).

The staff reviewed the revised license condition, which ~~replaces~~ supersedes the current PLANT fire protection license condition X.X, for consistency with the content guidance outlined by Regulatory Position C.3.1 of RG 1.205, Revision 1. This section of RG 1.205 outlines an approach acceptable to the NRC staff for promulgating a fire protection license condition in accordance with the requirements of NFPA 805. Overall, the licensee's ~~revised~~replacement license condition conforms to the guidance in RG 1.205, Revision 1.

Furthermore, the revised license condition, as specified by the sample license condition, identifies the plant-specific modifications outlined in the LAR, and associated implementation schedules, which must be accomplished at PLANT to complete transition to NFPA 805. In addition, the revised license condition includes a requirement that appropriate compensatory measures will remain in place until implementation of the specified plant modifications is completed. These modifications, implementation schedules, and compensatory measures ensure that completion of the transition to NFPA 805 at PLANT will be orderly and conducted in accordance with the applicable regulations and license conditions.

~~The revised license condition differs from the sample license condition in the identification of plant-specific modifications, and associated implementation schedules. These modifications and implementation schedules are necessary for PLANT to achieve full compliance with 10 CFR 50.48(c). Also, the revised license condition includes a condition that appropriate compensatory measures will remain in place until implementation of the modifications is complete. These~~

~~modifications and implementation schedules are the same as identified elsewhere in the LAR, as reviewed by the staff in Sections 3.1.2 and 3.1.6 of this safety evaluation.~~
Once these and other implementation issues are completed, NFPA 805 will be fully in effect at PLANT, and provided that the licensee implements the RI/PB FPP as described in the LAR, as supplemented, LICENSEE will be in full compliance with 10 CFR 50.48(c). These modifications and implementation schedules are identical to those identified in the LAR, as discussed in Sections 2.8.1 and 2.8.2, and explicitly reviewed in Section 3.0, of this safety evaluation.

Because (1) the licensee's revised license condition is consistent with the content and format of the sample license condition in RG 1.205, Revision 1, considering that the plant-specific modifications identified in the license condition are identical to those reviewed in this safety evaluation, and (2) this revised license condition and this safety evaluation supersede all existing fire protection license conditions(s) and previous FPP safety evaluation reports, the NRC staff finds the revised license condition acceptable. Section 4.0 of this safety evaluation provides the revised PLANT FPP license condition.

2.4.3. Technical Specifications

The NRC staff reviewed LAR Section 5.2.2, "Technical Specifications" and Attachment N, "Technical Specification Changes," with regard to proposed changes to the PLANT TSs that are being revised or superseded during the NFPA 805 transition process. According to the LAR, the licensee conducted a review of the PLANT TSs, including proposed TS changes that have been submitted to the NRC for approval, to determine which TS sections will be impacted by the transition to a RI/PB FPP based on 10 CFR 50.48(c), and identified [insert number] changes.

[Describe any changes to the technical specifications identified by the licensee in the LAR. Include a an evaluation of the proposed change]

2.5. Final Safety Analysis Report

The staff reviewed LAR Attachment X, "UFSAR Changes" with regard to changes PLANT is proposing to make to the Updated Final Safety Analysis Report (UFSAR). Attachment X states that these changes will be made in accordance with 10 CFR 50.71(e) by applying PLANT'S FSAR update procedures.

The licensee's proposed changes to the UFSAR are in Section 9.5.1, "Fire Protection Program." *[Describe the proposed changes to the UFSAR. You may including the following: the design basis, a brief system description, an overview of the fire safety analysis, a discussion of the inspection and testing program, a discussion of the monitoring program, a summary of the FPP management policy and direction, and a discussion of responsibilities and qualification of staff involved in the FPP, including the fire brigade.]*

The NRC staff reviewed these revisions using the guidance on level-of-detail for updating FSARs in NEI 98-03 (Reference X), which was endorsed by NRC in RG 1.181 (Reference X). According to this guidance "licensees may simplify their UFSARs by removing information that is duplicated in separate, controlling program documents such as … Fire Protection Plan…" so long as the controlling program documents are referenced. While the licensee's draft UFSAR revision provides *[describe the evaluation of the UFSAR].*

Since the draft UFSAR revision references appropriate PLANT documents that provide a more detailed description and basis for the RI/PB FPP, and since PLANT commits to submit to the NRC final changes to the UFSAR in accordance with the requirements of 10 CFR 50.71(e), the NRC staff finds the proposed general approach ~~and level of detail~~ in the UFSAR acceptable because they are consistent with NEI 04-02, Section 4.6.1, as endorsed by RG 1.205, Revision 1.

2.6. Rescission of Exemptions

The NRC staff reviewed LAR Section 5.2.3, "Orders and Exemptions," Attachment O, "Orders and Exemptions," and Attachment K, "Existing Licensing Action Transition," with regard to previously-approved exemptions to Appendix R to 10 CFR Part 50, which the transition to a FPP licensing basis in conformance with NFPA 805 will supersede.

[If the plant has exemptions in its existing licensing basis:

The licensee requested and received NRC approval for *[insert number]* exemptions from 10 CFR Part 50 Appendix R. The NRC staff individually addresses the applicability and continuing validity of these exemptions as incorporated into the NFPA 805 FPP as part of the staff's review of the appropriate section or fire area involved.

[List exemptions and state whether or not this licensing action rescinds them.]

[If the plant has no exemptions in its existing licensing basis, use the following:

The licensee determined that no exemptions to 10 CFR Part 50, Appendix R, need to be superseded to implement a FPP at PLANT that complies with 10 CFR Part 50.48(c).

2.7. Self Approval Process for Fire Protection Program Changes (Post-Transition)

Upon completion of the implementation of the RI/PB FPP based on NFPA805 and issuance of the license condition discussed in Section 4.0 of this safety evaluation, changes to the approved FPP must be evaluated to ensure that they are acceptable.

NFPA 805 Section 2.2.9, "Plant Change Evaluation," states the following:

> 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, "Plant Change Evaluation," states:

> 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 the acceptability of risk, defense-in-depth, and safety margins.

NFPA 805, Section 2.4.4, outlines a process that allows licensees to make changes to the fire protection program. The process envisioned by the NRC staff when 10 CFR 50.48(c) was

promulgated included provisions to allow certain risk-informed and/or performance-based changes to the FPP be made by the licensee without prior NRC review and approval, provided that the processes and methods used meet the regulatory requirements. The specific implementation guidance documents associated with NFPA 805 (NEI 04-02, Section 5.3, and RG 1.205, Regulatory Position C.3.2) address the screening process and other requirements necessary to allow self approval of plant changes with the potential to impact the RI/PB FPP.

RG 1.205, Regulatory Position C.3.2.3, "NRC Approval of Fire Protection Program Changes," provides the following examples of fire protection program changes that licensees must submit for NRC review and approval through a license amendment request before implementation:

- Changes that do not meet the acceptance criteria of the approved license condition.

- Changes to the fundamental fire protection program elements and design requirements of NFPA 805 Chapter 3 that utilize performance-based methods, unless otherwise specified in the fire protection license condition for the plant.

- Changes that have been evaluated using risk-informed or performance-based alternatives to compliance with NFPA 805, where the alternatives have not been approved for use by a license amendment, as required by 10 CFR 50.48(c)(4).

- Combined changes where any individual change would not meet the risk acceptance criteria of the approved license condition.

2.7.1. Post-Implementation Plant Change Evaluation Process

The NRC staff reviewed LAR Section 4.7.2, "Compliance with Configuration Control Requirements in Section 2.7.2 of NFPA 805," for compliance with the NFPA 805 plant change evaluation process requirements. To address potential changes to the NFPA 805 RI/PB FPP after implementation is completed, the licensee developed a change process that is based on the guidance provided in NEI 04-02, Revision 2, Section 5.3, "Plant Change Process," as well as and Appendices I and J (Reference X) as modified by RG 1.205, Revision 1, Regulatory Position 3.2. *[Verify that the change process is in fact based on these references]*

LAR Section 4.7.2 states that the plant change process consists of four subtasks:

- defining the change
- preliminary risk screening
- risk evaluation
- acceptability determination

[Summarize the proposed change evaluation process. Include a discussion of the scope of changes to which the change process may be applied (i.e. minor program changes that do not require detailed fire or risk analyses). Also include a discussion of PRA quality commitments to support the change process.]

[Assuming the change process involves risk evaluations at some stage, summarize the attributes of the evaluation process proposed by the licensee, the methods to be used, any guidance utilized, and the acceptance criteria that will be used for the risk evaluations. Include

a cross-reference to Section 3.4.1 for PRA technical adequacy, if appropriate. Finally, provide an evaluation of the proposed risk evaluation process.]

2.7.2. Guidelines for the Risk-Informed Self Approval Process Regarding Plant Changes

Once the delta risk numbers have been calculated, the final step in the plan change evaluation process involves determining whether the proposed change is acceptable with respect to risk, defense-in-depth, and safety margins, such that prior NRC review and approval is not required to implement the change. This step utilizes the guidance provided in NEI 04-02 and RG 1.205, Revision 1 (note that both NEI 04-02 and RG 1.205, Revision 1, reference RG 1.174, Revision 1, as part of the basis for this determination of acceptability), which generally outline that prior NRC review and approval is not required for changes that represent a decrease in risk or which result in a risk increase less than 1×10E-7 per year (/yr) for core damage frequency and less than 1×10E-8 per year for large early release frequency.

The acceptable risk thresholds were chosen an order of magnitude below "very small" as defined in RG 1.174. This provides reasonable assurance that (1) the actual risk increase from a change that does not require prior NRC review and approval remains acceptable even considering uncertainty, and (2) cumulative risk increases associated with these changes will not be unacceptable. NFPA 805 requires evaluation of cumulative risk when more than one change to a fire protection program is made. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. Implementation of the licensee's proposed plant change evaluation process will be governed by the requirements in the license condition issued with this safety evaluation.

Risk assessments performed to evaluate plant change evaluations must utilize methods that are acceptable to the NRC staff. Acceptable methods to assess the risk of the proposed plant change may include methods that have been used in developing the peer-reviewed Fire PRA model, methods that have been approved by the NRC via a plant-specific license amendment or through NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.

According to the LAR, the licensee intends to use a Fire PRA to evaluate the risk of proposed future plant changes. Section 3.4.1 of this safety evaluation discusses the technical adequacy of the Fire PRA, including the licensee's process to ensure that the Fire PRA remains current. The staff finds that the licensee's process for self-approving future fire protection program changes is acceptable because (1) the NFPA 805 license condition includes the acceptance criteria and other attributes from the sample license condition contained in RG 1.205, Revision 1, and (2) the quality of the licensee's Fire PRA, peer reviewed using the guidance of RG 1.200, and (3) associated administrative controls and processes for maintaining the quality of the PRA model is sufficient to support self-approval of future risk-informed changes to the fire protection program under the NFPA 805 license condition.

[include the following paragraph for any plant-specific modifications that affect the NRC safety determination regarding use of Fire PRA for self-approval]

However, it should be noted that unless a proposed change to the licensee's fire protection program has been demonstrated to have no more than a minimal risk impact using the approved screening method, risk-informed changes to the RI/PB FPP which involve fire areas that credit *[insert modification]* may not be made without prior NRC review and approval until the PLANT Fire PRA model has been modified to incorporate an NRC-accepted method for

modeling *[insert modification]*. This is in accordance with PLANT's plant-specific NFPA 805 license condition and is further discussed in Section 3.4.1 of this safety evaluation.

Based on the information provided by the licensee in the LAR, the process established to evaluate post-transition plant changes meets the guidance in NEI 04-02, Revision 2, as well as RG 1.205, Revision 1. The NRC staff finds that the proposed plant change evaluation process at PLANT, which includes *[summarize the process]*, is acceptable because it addresses the required delta risk calculations, utilizes risk assessment methods acceptable to the NRC, uses appropriate risk acceptance criteria in determining acceptability, involves the use of a Fire PRA of acceptable quality, and includes an integrated assessment of risk, DID, and safety margins.

Before achieving full compliance with 10 CFR 50.48(c) by implementing the plant modifications listed in Section 2.8.1 of this safety evaluation (i.e., during full implementation of the transition to NFPA 805), risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact using the *[summarize the process]* discussed above. In addition, the licensee is required to ensure that fire protection DID and safety margins are maintained during the transition process. The Transition License Conditions in the NFPA 805 license condition include the appropriate acceptance criteria and other attributes to form an acceptable method for meeting Regulatory Position C.3.1 of RG 1.205, Revision 1, with respect to the requirements for fire protection program changes during transition, and therefore demonstrate compliance with 10 CFR 50.48(c).

The NRC staff also finds that the fire risk evaluation methods used at PLANT to model the cause and effect relationship of associated changes as a means of assessing the risk of plant changes during transition to NFPA 805 may continue to be used after implementation of the RI/PB FPP, based on the licensee's administrative controls to ensure that the models remain current and to assure continued quality (see SE Section 3.4.1, "Quality of the Fire Probabilistic Risk Assessment"). Accordingly, these cause and effect relationship models may be used after transition to NFPA 805 as a part of the fire risk evaluations conducted to determine the change in risk associated with proposed plant changes.

2.7.3. Guidelines for the Qualitative Self Approval Process Regarding Plant Changes

The NFPA 805 license condition also includes a provision for self approval of changes to the fire protection program that may be made on a qualitative, rather than risk-informed, basis. Specifically, the license condition states that prior NRC review and approval are not required for changes to the NFPA 805 Chapter 3 fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the NFPA 805 Chapter 3 element is functionally equivalent or adequate for the hazard.

The licensee may use an engineering evaluation to demonstrate that a change to an NFPA 805 Chapter 3 element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement (i.e., has not impacted its contribution toward meeting the nuclear safety and radioactive release performance criteria), using a relevant technical requirement or standard.

The licensee has requested the ability to utilize fire protection engineering evaluations to demonstrate that minor deviations in the systems, methods, or devices used to comply with the fundamental fire protection program elements and design requirements of NFPA 805 Chapter 3

are "functionally equivalent" to the standard element. These fire protection engineering evaluations utilize a qualitative analysis conducted by a qualified fire protection engineer to determine that the condition does not affect the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard. The basis of approval for a functionally equivalent evaluation is that it achieves the desired result, which is maintaining the function of the NFPA 805 requirement. As such, determination that the condition is functionally equivalent means that the evaluated condition complies with the code.

Use of this approach does not fall under NFPA 805, Section 1.7, "Equivalency," because the condition can be shown to meet the NFPA 805 Chapter 3 requirement. Section 1.7 of NFPA 805 is a standard format used throughout NFPA standards. It is intended to allow owner/operators to utilize the latest state of the art fire protection features, systems, and equipment, provided the alternatives are of equal or superior quality, strength, fire resistance, durability, and safety. However, the intent is to require approval from the authority having jurisdiction because not all of these state of the art features are in current use or have relevant operating experience. This is a different situation than the use of functional equivalency since functional equivalency demonstrates that the condition meets the NFPA 805 code requirement.

Alternatively, the licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805 Chapter 3 elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805 Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement (with respect to the ability to meet the nuclear safety and radioactive release performance criteria), using a relevant technical requirement or standard.

The four specific sections of NFPA 805 Chapter 3 for which prior NRC review and approval are not required to implement alternatives that an engineering evaluation has demonstrated are adequate for the hazard are as follows:

- 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).

The engineering evaluations described above (i.e., functionally equivalent and adequate for the hazard) are engineering analyses governed by the NFPA 805 guidelines. In particular, this means that the evaluations must meet the requirements of NFPA 805, Section 2.4, "Engineering Analyses," and NFPA 805, Section 2.7, "Program Documentation, Configuration Control, and Quality." Specifically, the effectiveness of the fire protection features under review must be evaluated and found acceptable in relation to their ability to detect, control, suppress, and extinguish a fire and provide passive protection to achieve the performance criteria while not exceed the damage threshold for the plant being analyzed. The associated evaluations must also meet the documentation content (as outlined by NFPA 805, Section 2.7.1, "Content") and quality requirements (as outlined by NFPA 805, Section 2.7.3, "Quality") of the standard in order to be considered adequate. Note that the NRC staff's review of the licensee's compliance with NFPA 805, Sections 2.7.1 and 2.7.3, is provided in Section 3.8 of this safety evaluation.

According to the LAR, the licensee intends to use a Fire PRA to evaluate the risk of proposed future plant changes. Section 3.4.1, "Quality of the Fire Probablistic Risk Assessment," of this safety evaluation discusses the technical adequacy of the Fire PRA, including the licensee's process to ensure that the Fire PRA remains current. Because (1) the proposed NFPA 805 license condition includes the acceptance criteria and other attributes from the sample license condition contained in RG 1.205, Revision 1, and (2) the NRC staff determined that the quality of the licensee's Fire PRA and associated administrative controls and processes for maintaining the quality of the PRA model is sufficient to support self-approval of future risk-informed changes to the fire protection program under the proposed license condition, the staff finds that the licensee's process for self-approving future fire protection program changes is acceptable.

The NRC staff also finds that the fire risk evaluation methods used at PLANT to model the cause and effect relationship of associated changes as a means of assessing the risk of plant changes during transition to NFPA 805 may continue to be used after implementation of the RI/PB FPP, based on the licensee's administrative controls to ensure that the models remain current and to assure continued quality (see SE Section 3.4.1, "Quality of the Fire Probablistic Risk Assessment"). Accordingly, these cause and effect relationship models may be used after transition to NFPA 805 as a part of the fire risk evaluations conducted to determine the change in risk associated with proposed plant changes.

2.8. Implementation

Regulatory Position C.3.1 of RG 1.205, Revision 1, provides guidance that the NFPA 805 license condition presented in the LAR should include the following: (1) a list of modifications being made to bring the plant into compliance with 10 CFR 50.48(c); (2) a schedule detailing when these modifications will be completed; and (3) a commitment to maintain appropriate compensatory measures in place until implementation of the modifications is completed.

2.8.1. Modifications

The NRC staff reviewed LAR Attachment S, "Plant Modifications and Items to be Completed During Implementation," which describes the PLANT plant modifications necessary to implement the NFPA 805 licensing basis, as proposed. These modifications are identified in the LAR as necessary to bring PLANT into compliance with either the deterministic or performance-based requirements of NFPA 805. LAR Table S-1 in Attachment S provides a description of each of the proposed plant modifications, presents the problem statement explaining why the modification is needed, and identifies the compensatory actions required to be in place pending completion/implementation of the modification.

The NRC staff's review confirmed that the modifications identified in LAR Table S-1 are the same as those identified in LAR Table B-3, "Fire Area Transition," on a fire area basis, as the modifications being credited in the proposed NFPA 805 plant configuration and licensing basis. The staff also confirmed that the LAR Table S-1 modifications and associated implementation schedule are the same as those provided in the ~~revised~~ proposed NFPA 805 license condition, and for which the licensee has committed to keep the appropriate compensatory measures in place until the modifications have been completed. LAR Attachment S also provides a list of the modifications the licensee indicated it has already completed at PLANT as part of the NFPA 805 transition (note that these were not independently verified by the NRC staff). Table 2.8.1.-1 provides a summary of these changes.

Table 2.8.1-1 Completed Plant Modifications

Engineering Change No.	Completed Plant Modification
XXXXX	[Insert brief description of the modification.]

LAR Table S-1 provides a detailed listing of the committed plant modifications that must be completed in order for PLANT to be fully in accordance with NFPA 805, implement many of the attributes upon which this safety evaluation is based and thereby meet the requirements of 10CFR 50.48(c). As discussed above, these modifications will be implemented in accordance with the schedule provided in the NFPA 805 license condition, which states that all modifications will be in place by MONTH DAY, YEAR.

In addition, the licensee committed to keep the appropriate compensatory measures in place until the modifications have been fully implemented. Table 2.8.1-2 presents a simplified version of LAR Table S-1.

Table 2.8.1-2 Committed Plant Modifications

Modification No.	Problem Statement	Modification Description
XXXXX	[Insert brief description of the modification purpose.]	[Insert brief description of the modification.]

2.8.2. Schedule

LAR Section 5.4 provides the overall schedule for completing the NFPA 805 transition at PLANT. The licensee stated that it will complete the implementation of the new program, including any necessary reviews, procedure changes, process updates, and training for affected plant personnel to implement the NFPA 805 FPP within XX days after NRC approval, as conveyed by the date of issuance of this safety evaluation.

LAR Section 5.4 also states that all modifications necessary for PLANT to fully implement the transition to NFP 805 will be completed by MONTH DAY, YEAR. In addition, the revised license condition includes a statement that appropriate compensatory measures will remain in place until implementation of these modifications is complete (see Section 4.0 of this safety evaluation). In most cases, these compensatory measures involve *[summarize the compensatory measures]*.

2.9. Summary of Implementation Items

Implementation Items are items that the licensee has not fully completed or implemented as of the issuance date of the safety evaluation, but which will be completed during implementation of the license amendment to transition to NFPA 805 (e.g., procedure changes that are still in

process, NFPA 805 programs that have not been fully implemented, personnel training that is underway, etc.). These items, do not impact the bases for the safety conclusions made by the NRC staff in the associated SE.

For each implementation item, the licensee and the NRC staff have reached a satisfactory resolution involving the level of detail and main attributes that each remaining change will incorporate upon completion. In addition, the licensee provided a commitment and a date by which each implementation item will be completed.

Per this commitment from the licensee (Reference X), each implementation item will be completed prior to the deadline for implementation of the RI/PB FPP based on NFPA 805, as specified in the license condition and the letter transmitting the amended license (i.e., *[insert number]* days from the issuance date of the SE).

The NRC staff, through an onsite audit or during a future fire protection inspection, may choose to examine the closure of the implementation items, with the expectation that any variations discovered during this review, or concerns with regard to adequate completion of the implementation item, would be tracked and dispositioned appropriately under the licensee's corrective action program.

As a result of its review of the PLANT NFPA 805 LAR, the NRC staff identified the implementation items contained in Table 2.9-1. For tracking purposes, the staff assigned a unique identifying number to each implementation item.

The table also specifies the associated section of the SE in which the implementation item is identified, as well as the appropriate licensee document which denotes that the action associated with the implementation item is still ongoing and provides some additional level of detail regarding what the change will entail.

Table 2.9-1: NFPA 805 Implementation Items

#	SE Section	Implementation Item Description	PLANT Document
1	*Insert cross reference to SE section*	*Insert brief summary of the confirmatory item.*	*Insert reference to docketed material submitted by licensee*

3.0 TECHNICAL EVALUATION

The following sections evaluate the technical aspects of the requested license amendment to transition the FPP at PLANT to one based on NFPA 805 in accordance with 10 CFR 50.48(c). While performing the technical evaluation of the licensee's submittal, the NRC staff utilized the guidance provided in NUREG-0800, Section 9.5.1.2, "Risk-Informed, Performance-Based Fire Protection" (Reference X), to determine whether the licensee had provided sufficient information in both scope and level of detail to adequately demonstrate compliance with the requirements of NFPA 805. Specifically:

- Section 3.1 provides the results of the NRC staff review of the licensee's transition of the fire protection program from the existing deterministic guidance to that of NFPA 805 Chapter 3, "Fundamental Fire Protection Program and Design Elements."

- Section 3.2 provides the results of the NRC staff review of the methods used by the licensee to demonstrate the ability to meet the nuclear safety performance criteria.

- Section 3.3 provides the results of the NRC staff review of the fire modeling methods used by the licensee to demonstrate the ability to meet the nuclear safety performance criteria using a fire modeling performance-based approach.

- Section 3.4 provides the results of the NRC staff review of the fire risk assessments used to demonstrate the ability to meet the nuclear safety performance criteria using a fire risk evaluation performance-based approach.

- Section 3.5 provides the results of the NRC staff review of the licensee's nuclear safety capability assessment results by fire area.

- Section 3.6 provides the results of the NRC staff review of the methods used by the licensee to demonstrate an ability to meet the radioactive release performance criteria.

- Section 3.7 provides the results of the NRC staff review of the NFPA 805 monitoring program developed as a part of the transition to a RI/PB FPP based on NFPA 805.

- Section 3.8 provides the results of the NRC staff review of the licensee's program documentation, quality assurance and configuration management.

Most of the above sections (including the associated subsections) are preceded by additional regulatory criteria from the NFPA 805 standard that is meant to establish a clear basis for the NRC staff review described in each section. This information is intended to be used in conjunction with the associated overarching regulations and guidance documents discussed in Section 2.0 of this safety evaluation to determine whether the appropriate acceptance criteria have been met for the use of a RI/PB FPP in accordance with NFPA 805.

In addition, Attachments A - E to this safety evaluation provide additional detailed information that was evaluated and/or dispositioned by the NRC staff to support the licensee's request to transition to a RI/PB FPP in accordance with NFPA 805 (i.e., 10 CFR 50.48(c)). These attachments are discussed as appropriate in the associated section of the safety evaluation.

3.1. NFPA 805 Fundamental FPP Elements and Minimum Design Requirements

NFPA 805 Chapter 3 contains the fundamental elements of the fire protection program and specifies the minimum design requirements for fire protection systems and features that are necessary to meet the standard. The fundamental FPP elements and minimum design requirements include necessary attributes pertaining to the fire protection plan and procedures, the fire prevention program and design controls, internal and external industrial fire brigades, and fire protection SSCs. However, 10 CFR 50.48(c) takes exception to three specific requirements of NFPA 805 Chapter 3, and provides alternative requirements as follows:

- 10 CFR 50.48(c)(2)(v) – Existing cables. In lieu of installing cables meeting flame propagation tests as required by Section 3.3.5.3 of NFPA 805, a flame-retardant coating may be applied to the electric cables, or an automatic fixed fire suppression system may be installed to provide an equivalent level of protection. In addition, the italicized exception to Section 3.3.5.3 of NFPA 805 is not endorsed.
- 10 CFR 50.48(c)(2)(vi) – Water supply and distribution. The italicized exception to Section 3.6.4 of NFPA 805 is not endorsed. Licensees who wish to use the exception to Section 3.6.4 of NFPA 805 must submit a request for a license amendment in accordance with 10 CFR 50.48(c)(2)(vii).
- 10 CFR 50.48(c)(2)(vii) – Performance-based methods. While Section 3.1 of NFPA 805 prohibits the use of performance-based methods to demonstrate compliance with the NFPA 805 Chapter 3 requirements, 10 CFR 50.48(c)(2)(vii) specifically permits that the FPP elements and minimum design requirements of NFPA 805 Chapter 3 may be subject to the performance-based methods permitted elsewhere in the standard.

Furthermore, Section 3.1 of NFPA 805 specifically allows the use of alternatives to the NFPA 805 Chapter 3 fundamental FPP requirements that have been previously approved by the NRC (which is the authority having jurisdiction (AHJ), as denoted in NFPA 805), and are contained in the currently approved FPP for the facility.

3.1.1. Compliance with NFPA 805 Chapter 3 Requirements

The licensee used the systematic approach described in NEI 04-02, Revision 2 (Reference X), as endorsed by the NRC in Regulatory Guide 1.205, Revision 1 (Reference X), to assess the proposed PLANT FPP against the NFPA 805 Chapter 3 requirements. The NEI 04-02 based approach was modified in regard to existing PLANT FPP elements that comply via previous approval, as described in the licensee's supplemental letter dated MONTH DAY, YEAR. For these elements, rather than providing excerpts from both the associated submittal and approval documents, as outlined in Appendix B, "Detailed Transition Assessment of Fire Protection Program," of NEI 04-02, the licensee provided only an excerpt from the NRC approval document as a part of the compliance basis statement, on the condition that the excerpt included sufficient information to fully understand the basis for previous approval without the need for additional information from the submittal document. The NRC staff has determined that, taken together, this constitutes an acceptable approach for documenting compliance with the NFPA 805 Chapter 3 requirements.

As part of this assessment, the licensee reviewed each section and subsection of NFPA 805 Chapter 3 against the existing PLANT FPP and provided specific compliance statements for each NFPA 805 Chapter 3 attribute that contained applicable requirements. As discussed below, some subsections of NFPA 805 Chapter 3 do not contain requirements, or are otherwise not applicable to PLANT.

The methods used by PLANT for achieving compliance with the NFPA 805 Chapter 3 fundamental FPP elements and minimum design requirements are as follows: *[eliminate any that do not apply]*

1. The existing FPP element directly complies with the requirement: noted in LAR Attachment A, "NEI 04-02 Table B-1, Transition of Fundamental Fire Protection Program and Design Elements (NFPA 805 Chapter 3)," also called the B-1 Table, as "Complies."

2. The existing FPP element complies through the use of an explanation or clarification: noted in the B-1 Table as "Complies with Clarification."

3. The existing FPP element complies with the requirement based on prior NRC approval of an alternative to the fundamental FPP attribute and the bases for the NRC approval remain valid: noted in the B-1 Table as "Complies Via Previous NRC Approval."

4. The existing FPP element complies through the use of existing engineering equivalency evaluations (EEEEs) whose bases remain valid and are of sufficient quality: noted in the B-1 Table as "Complies with the Use of EEEEs."

5. The existing FPP element does not comply with the requirement, but the licensee is requesting specific approval for a performance-based method in accordance with 10 CFR 50.48(c)(2)(vii): noted in the B-1 Table as "License Amendment Required."

[Describe any modifications to the NEI04-02 approach used by the licensee]

The licensee stated in LAR Section 4.2.2, "Existing Engineering Equivalency Evaluation Transition," that it evaluated the EEEEs used to demonstrate compliance with the NFPA 805 Chapter 3 requirements in order to ensure continued appropriateness, quality, and applicability to the current PLANT plant configuration. Additionally, the licensee stated in LAR Section 4.2.3, "Licensing Action Transition," that the existing licensing actions used to demonstrate compliance have been evaluated to ensure that their bases remain valid.

Table 3.1-1, "NFPA 805 Chapter 3 Fundamental Elements Compliance Matrix," in Attachment A to this safety evaluation, provides the specific FPP elements and minimum design requirements from NFPA 805 Chapter 3, as appropriately modified by 10 CFR 50.48(c). In addition, the table describes each fundamental FPP element from NFPA 805 Chapter 3 and identifies which of the methods listed above the licensee used as the means for achieving compliance with the requirement.

SE Table 3.1-1 also provides the results of the NRC staff's evaluation of the licensee's compliance statement for each FPP element. LAR Attachment A (the NEI 04-02 B-1 Table) provides further details regarding the licensee's compliance strategy for specific NFPA 805 Chapter 3 requirements, including references to where compliance is documented.

For approximately XX percent of the NFPA 805 Chapter 3 requirements, as modified by 10 CFR 50.48(c)(2), the licensee determined that the RI/PB FPP complies directly with the fundamental FPP element using the existing fire protection program element. In these instances, based on the validity of the licensee's statements, the NRC staff finds the licensee's statements of compliance acceptable.

For approximately XX percent of the NFPA 805 Chapter 3 requirements, the licensee provided additional clarification when describing its means of compliance with the fundamental FPP element. In these instances, the NRC staff reviewed the additional clarifications and concludes that the licensee will meet the underlying requirement for the FPP element as clarified.

For approximately XX per cent of the NFPA 805 Chapter 3 requirements, the licensee demonstrated compliance with the fundamental FPP element through the use of EEEEs. The NRC staff reviewed the licensee's statement of continued validity for the EEEEs, as well as a

statement on the quality and appropriateness of the evaluations, and finds the licensee's statements of compliance in these instances acceptable.

Approximately XX per cent of the NFPA 805 Chapter 3 requirements were supplanted by an alternative that was previously approved by the NRC. *[If the plant was licensed before 1979 use the following:]* The NRC approval was documented in (1) the original YEAR FPP Safety Evaluation Report (Reference X), (2) Supplement X (Reference X) to the original report, which was issued in YEAR, or (3) a YEAR exemption approving the use of *[describe the approved exemption]* (Reference X). *[If the plant was licensed after 1979 use the following:]* The NRC approval was documented in (1) the original YEAR FPP Safety Evaluation Report (Reference X), (2) Supplement X (Reference X) to the original report, which was issued in YEAR, or (3) a YEAR license amendment approving the use of *[describe the approved deviation]* (Reference X).

In each instance, the licensee evaluated the basis for the original NRC approval and determined that in all cases the bases were still valid. The NRC staff reviewed the information provided by the licensee and concludes that previous NRC approval had been demonstrated using suitable documentation that meets the approved guidance contained in RG 1.205, Revision 1. Based on the licensee's justification for the continued validity of the previously approved alternatives to the NFPA 805 Chapter 3 requirements, the NRC staff finds the licensee's statements of compliance in these instances acceptable.

In the compliance statements for approximately XX per cent of the NFPA 805 Chapter 3 requirements, the licensee used more than one of the above strategies to demonstrate compliance with aspects of the fundamental FPP element. In each of these cases, the NRC staff found the compliance statements acceptable, for the reasons outlined above.

The licensee also requested approval for the use of a performance based method to demonstrate compliance with a fundamental FPP element. In accordance with 10 CFR 50.48(c)(2)(vii), the licensee requested specific approval be included in the license amendment approving the transition to NFPA 805 at PLANT. The requested performance-based method pertains to the requirement contained in NFPA 805 Chapter 3, Section X.X.XX, which concerns the *[describe the deviation]*. As discussed in SE Section 3.1.4 below, the staff finds the use of a performance-based method to demonstrate compliance with this fundamental FPP element acceptable.

Some NFPA 805 Chapter 3 sections either do not apply to the transition to a RI/PB FPP at PLANT, or have no technical requirements. Accordingly, the NRC staff did not review these sections for acceptability. The sections that were not reviewed fall into one of four categories:

- Sections that do not contain any technical requirements. (e.g., NFPA 805 Chapter 3, Section 3.4.5 and Section 3.11).
- Sections that are not applicable to PLANT because of the following:

    — The licensee states that PLANT does not have systems of this type installed (e.g., *list the subsection and a brief description of the requirement*).

    — The type of system, while installed at PLANT, is not required under the RI/PB FPP (e.g., *list the subsection and a brief description of the requirement*).

— The requirements are structured with an applicability statement (e.g., NFPA 805 Chapter 3 Section 3.4.1(a)(2) and Section 3.4.1(a)(3), wherein the determination of which NFPA code(s) apply to the fire brigade depends on the type of brigade specified in the FPP).

In Table 3.1-1 of Attachment A to this safety evaluation, the sections that were not reviewed by NRC staff are shaded.

As documented in SE Table 3.1-1 and discussed above, the NRC staff evaluated the results of the licensee's assessment of the proposed PLANT RI/PB FPP against the NFPA 805 Chapter 3 fundamental fire protection program elements and minimum design requirements, as modified by the exceptions, modifications, and supplementations in 10 CFR 50.48(c)(2). Based on this review of the licensee's submittal, as supplemented, the NRC staff finds the RI/PB FPP acceptable with respect to the fundamental fire protection program elements and minimum design requirements of NFPA 805 Chapter 3, as modified by 10 CFR 50.48(c)(2), because the licensee accomplished the following:

- Used an overall process consistent with NRC staff approved guidance to determine the state of compliance with each of the applicable NFPA 805 Chapter 3 requirements.

- Provided appropriate documentation of PLANT's state of compliance with the NFPA 805 Chapter 3 requirements, which adequately demonstrated compliance in that the licensee was able to substantiate that it complied:

  — With the requirement directly.

  — With the intent of the requirement (or element) given adequate justification.

  — Via previous NRC staff approval of an alternative to the requirement.

  — Through the use of an engineering equivalency evaluation.

  — Through the use of a combination of the above methods.

  — Through the use of a performance-based method that the NRC staff has specifically approved in accordance with 10 CFR 50.48(c)(2)(vii).

3.1.2. Identification of the Power Block

The NRC staff reviewed the PLANT structures identified in LAR Table I-1 "PLANT Power Block Definition" as comprising the "power block." The plant structures listed are established as part of the "power block" for the purpose of denoting the structures and equipment included in the PLANT RI/PB FPP that have additional requirements in accordance with 10 CFR 50.48(c) and NFPA 805. As stated in the LAR, power block equipment includes all the SSCs required for the safe and reliable operation of the nuclear power plant. It includes all safety-related and balance-of-plant systems and components required for the operation of the station, including radioactive waste processing and storage, and switchyard equipment maintained by the station. The staff finds that the licensee has appropriately evaluated the structures and equipment at PLANT, and adequately documented a list of those structures that fall under the definition of "power block" in NFPA 805.

3.1.3. Electrical Raceway Fire Barrier Systems

NFPA 805, Section 3.11.5, "Electrical Raceway Fire Barrier Systems (ERFBS)," requires that ERFBS be capable of resisting the fire effects of the hazards in the area. The ERFBS must also be tested in accordance with, and meet the acceptance criteria of Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Safe Shutdown Trains Within the Same Fire Area," to GL 1986-10, "Implementation of Fire Protection Requirements" (Reference 34). For this licensing action, the staff reviewed the electrical raceway and fire barrier systems identified in LAR Attachment A, "NEI 04-02 Table B-1 – Transition of Fundamental FP Program and Design Elements."

[If the generic issue has never been applicable to the applicant, include the following paragraph.]

PLANT does not utilize electrical raceway fire barrier systems (ERFBS), like Hemyc™ or MT™, in fire barrier systems. Therefore, the generic issue (GL 2006-03) related to the use of ERFBS is not applicable to PLANT.

[If the applicant has resolved the Hemyc™ and MT™ fire barrier issue prior to submittal of their RI/PB FPP LAR, include the following paragraph.]

PLANT utilizes electrical raceway fire barrier systems (ERFBS) (Hemyc™ and/or MT™) in fire barrier systems, therefore, the generic issue (GL 2006-03) related to the use of ERFBS is applicable to PLANT. However, the licensee has resolved all NRC staff concerns related to the use of ERFBS at PLANT prior to the submittal of the RI/PB FPP LAR *(cite the applicable SER).*

[If the applicant has not resolved the Hemyc™ and MT™ fire barrier issue prior to submittal of the RI/PB FPP LAR, insert a detailed assessment of the licensee's resolution of GL 2006-03, including:

- *Identify and briefly describe any proposed plant modifications.*
- *Verify that the proposed plant modifications are sufficient to resolve the issue.*
- *Identify the compensatory measures currently in place and the justification for their use, and verify that no compensatory measures will remain after implementation of proposed plant modifications.*
- *If performance-based methods are used, refer to Section 3.1.4 and/or Section 3.4 of this SER and conclude that the staff found that performance-based method **XX** was acceptable for this application at this particular plant.*

Sample concluding paragraph:

Based on the above discussion, the NRC staff concludes that the combination of *[insert all that apply: plant-specific fire testing, evaluations of installed configurations, performance-based evaluations (including fire risk evaluations), and proposed plant modifications],* while maintaining compensatory measures as necessary, is an adequate means for resolving the remaining GL 2006-03 issues regarding ERFBS fire barrier configurations at PLANT. *[if applicable]* Once the committed modifications are complete, the licensee's fire risk evaluations related to the RI/PB FPP demonstrate that those fire areas that credit the use of ERFBS will meet the nuclear safety performance criteria using a performance-based analysis, and are therefore acceptable.

3.1.4. Performance-Based Methods for NFPA 805 Chapter 3 Elements

[Include the following paragraph if the licensee does not propose to use performance-based methods to demonstrate compliance with the fundamental FPP and design elements in Chapter 3 of NFPA 805.]

The licensee did not propose to use any performance-based methods in their submittal to demonstrate compliance with the fundamental FPP and design elements in Chapter 3 of NFPA 805.

[Include the following section if the licensee does propose to use performance-based methods to demonstrate compliance with the fundamental FPP and design elements in Chapter 3 of NFPA 805.]

In accordance with 10 CFR 50.48(c)(2)(vii), a licensee may request NRC approval for use of the performance-based methods permitted elsewhere in the standard as a means of demonstrating compliance with the prescriptive fire protection program fundamental elements and minimum design requirements of NFPA 805 Chapter 3. Paragraph 50.48(c)(2)(vii) of 10 CFR requires that an acceptable performance-based approach accomplish the following:

(A) Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;

(B) Maintains safety margins; and

(C) Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

In LAR Attachment L, "NFPA 805 Chapter 3 Requirements for Approval (10 CFR 50.48(c)(2)(vii)," the licensee requested NRC staff review and approval of a performance-based method[s] to demonstrate an equivalent level of fire protection for the requirement of NFPA 805, Section X.X.X, regarding *[briefly describe the subject of the requirement. If more than one section is treated using PB methods, list each Section and corresponding subject].* The NRC staff evaluation of this proposed method is [*or* these proposed methods are] provided below.

3.1.4.1. First Performance-Based Method Used to Address a Chapter 3 Requirement

[Create one subsection for each performance-based method that the licensee used to demonstrate and equivalent level of fire protection as the requirements of NFPA 805 Chapter 3. For example, if the licensee used three performance-based methods, create subsections 3.1.4.1, 3.4.1.2, and 3.4.1.3 to address each method individually. This subsection can be used as a template for each of the subsequent subsections.]

The NRC staff reviewed the licensee's description of the method to confirm all of the following for the proposed method and its application, as required by 10 CFR 50.48(c)(2)(vii) and in accordance with RG 1.205, Regulatory Position 2.2.2.

For NFPA 805, Section X.X.X, the licensee requested approval of a performance-based method to justify …

[Provide an application-specific, detailed technical evaluation of the method. Describe the method in detail and compare it to the replaced requirement of NFPA 805 Chapter 3 in order to allow the reader to draw the conclusion that the method is essentially equivalent to the NFPA 805 Chapter 3 requirements (maintains overall plant safety with regards to fires). Include a concluding statement finding that the particular method is acceptable for the specific application to which it applies.

Sample conclusion paragraph:]

In accordance with 10 CFR 50.48(c)(2)(vii), the NRC staff finds the proposed performance-based method is acceptable for application in lieu of the corresponding NFPA 805, Section X.X.X requirement because it satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release, maintains sufficient safety margins, and maintains adequate fire protection DID.

3.2. Nuclear Safety Capability Assessment Methods

NFPA 805 is a performance-based standard that allows engineering analyses to be used to show that FPP features and systems provide sufficient capability to meet the requirements.

NFPA 805 Section 2.4, "Engineering Analyses," states the following:

> Engineering analysis is an acceptable means of evaluating a fire protection program against performance criteria. Engineering analyses shall be permitted to be qualitative or quantitative… 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 threshold defined in Section [2.5] for the plant area being analyzed.

NFPA 805 Chapter 1 defines the goals, objectives and performance criteria that the fire protection program must meet in order to be in accordance with NFPA 805.

> Nuclear Safety Goal
>
> The nuclear safety goal is to provide reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition.
>
> Nuclear Safety Objectives
>
> In the event of a fire during any operational mode and plant configuration, the plant shall be as follows:
>
> (1) *Reactivity Control*. Capable of rapidly achieving and maintaining subcritical conditions.

(2) *Fuel Cooling*. Capable of achieving and maintaining decay heat removal and inventory control functions.

(3) *Fission Product Boundary*. Capable of preventing fuel clad damage so that the primary containment boundary is not challenged.

Nuclear Safety Performance Criteria

Fire protection features shall be capable of providing reasonable assurance that, in the event of a fire, the plant is not placed in an unrecoverable condition. To demonstrate this, the following performance criteria shall be met.

(a) *Reactivity Control*. Reactivity control shall be capable of inserting negative reactivity to achieve and maintain subcritical conditions. Negative reactivity inserting shall occur rapidly enough such that fuel design limits are not exceeded.

(b) *Inventory and Pressure Control*. With fuel in the reactor vessel, head on and tensioned, inventory and pressure control shall be capable of controlling coolant level such that subcooling is maintained for a [pressurized water reactor] (PWR) and shall be capable of maintaining or rapidly restoring reactor water level above top of active fuel for a [boiling water reactor] (BWR) such that fuel clad damage as a result of a fire is prevented.

(c) *Decay Heat Removal*. Decay heat removal shall be capable of removing sufficient heat from the reactor core or spent fuel such that fuel is maintained in a safe and stable condition.

(d) *Vital Auxiliaries*. Vital auxiliaries shall be capable of providing the necessary auxiliary support equipment and systems to assure that the systems required under (a), (b), (c), and (e) are capable of performing their required nuclear safety function.

(e) *Process Monitoring*. Process monitoring shall be capable of providing the necessary indication to assure the criteria addressed in (a) through (d) have been achieved and are being maintained.

3.2.1. Compliance with NFPA 805 Nuclear Safety Capability Assessment Methods

NFPA 805, Section 2.4.2, “Nuclear Safety Capability Assessment,” states the following:

The purpose of this section is to define the methodology for performing a nuclear safety capability assessment. The following steps shall be performed:

(1) Selection of systems and equipment and their interrelationships necessary to achieve the nuclear safety performance criteria in Chapter 1

(2) Selection of cables necessary to achieve the nuclear safety performance criteria in Chapter 1

(3) Identification of the location of nuclear safety equipment and cables

(4) Assessment of the ability to achieve the nuclear safety performance criteria given a fire in each fire area

This section of the SE evaluates the first three of the topics listed above. Section 3.5 of this SE addresses the assessment of the fourth topic.

Regulatory Guide 1.205, Revision 1 (Reference X) endorses NEI 04-02, Revision 2 (Reference X), and Chapter 3 of NEI 00-01, Revision 2, "Guidance for Post-Fire Safe Shutdown Circuit Analysis" (Reference X), and promulgates the method outlined in NEI 04-02 for conducting a nuclear safety capability assessment. This NRC-endorsed method documents in a table format (i.e., NEI 04-02 Table B-2, "NFPA 805 Chapter 2 – Nuclear Safety Transition – Methodology Review") the licensee's comparison of its post-fire safe shutdown analyses to the guidance in NEI 00-01 Chapter 3, which has been determined to address the related requirements of NFPA 805, Section 2.4.2. The NRC staff reviewed LAR Section 4.2.1, "Nuclear Safety Capability Assessment Methodology," and Attachment B, "NEI 04-02 Table B-2 – Nuclear Safety Capability Assessment – Methodology Review," against these guidelines.

The licensee developed the PLANT NFPA 805 LAR based on the guidance provided in the three guidance documents cited above. Based on the information provided in the licensee's submittal, as supplemented, LICENSEE used a systematic process to evaluate the PLANT post-fire safe shutdown analysis against the requirements of NFPA 805, Section 2.4.2, Subsections (1), (2), and (3), which meets the methodology outlined in the latest NRC-endorsed industry guidance.

[Insert a detailed assessment of the licensee's nuclear safety capability assessment methodology review, including:

- *Verify that the nuclear safety capability assessment performed by the licensee is consistent with the methodology defined in Section 2.4.2 of NFPA 805 and includes:*
  - *Selection of systems and equipment and their interrelationships necessary to achieve the nuclear safety performance criteria in NFPA 805 Chapter 1*
  - *Selection of cables necessary to achieve the nuclear safety performance criteria in NFPA 805 Chapter 1*
  - *Identification of the location of nuclear safety equipment and cables*
  - *Assessment of the ability to achieve the nuclear safety performance criteria given a fire in each fire area.*
- *Verify that a systematic process was used to evaluate the plant post-fire safe shutdown analysis against the requirements of NFPA 805 Section 2.4.2. FAQ 07-0039 (NEI 04-02, Table B-2) provides one acceptable method for documenting the comparison of the post-fire safe shutdown analysis against the NFPA 805 requirements. This method first maps the existing post-fire safe shutdown analysis to the NEI 00-01, Rev. 1, Chapter 3 methodology which, in turn, is mapped to the NFPA 805 Section 2.4.2 requirements.*
  - *Verify that each applicable section of NEI 00-01 has been adequately addressed by the post-fire safe shutdown analysis and that the reviewer agrees with the alignment conclusions*
- *Verify that all non-conformances that will be carried forward as part of the transition and that have not been previously approved by the NRC (i.e., open items) have been*

entered in the plant's corrective action program and have an acceptable disposition strategy.]

The nuclear safety goals, objectives and performance criteria of NFPA 805 allow more flexibility than the previous deterministic fire protection programs based on Appendix R to 10 CFR 50 and NUREG-0800, Section 9.5.1, as well as, in part NEI 00-01, Chapter 3, since NFPA 805 only requires the licensee to maintain the fuel in a safe and stable condition rather than achieve and maintain cold shutdown. The licensee stated that the NFPA 805 licensing basis for PLANT is to *[describe the proposed safe and stable conditions]*.

The NRC staff reviewed the documentation provided by the licensee describing the process used to perform the NSCA required by NFPA 805, Section 2.4.2. The licensee performed this evaluation by comparing the PLANT post-fire safe shutdown analysis against the NFPA 805 NSCA requirements using the NRC-endorsed process in Chapter 3 of NEI 00-01, Revision 2 and documenting the results of the review in the B-2 Table in accordance with NEI 04-02, Revision 2. Based on the information provided in the licensee's submittal, as supplemented, the NRC staff accepts the method the licensee used to perform the NSCA with respect to the selection of systems and equipment, selection of cables, and identification of the location of nuclear safety equipment and cables, as required by NFPA 805, Section 2.4.2. The NRC staff accepts the licensee's method because it either met the NRC-endorsed guidance directly or met the intent of the endorsed guidance with adequate justification, as documented in Table 3.2-1 in Attachment B to this safety evaluation.

3.2.2. Applicability of Feed and Bleed

[Note: This subsection applies to PWRs only]

As stated below, 10 CFR 50.48(c)(2)(iii) limits the use of feed and bleed:

> In demonstrating compliance with the performance criteria of Sections 1.5.1(b) and (c), a high-pressure charging/injection pump coupled with the pressurizer power-operated relief valves (PORVs) as the sole fire-protected safe shutdown path for maintaining reactor coolant inventory, pressure control, and decay heat removal capability (i.e., feed-and-bleed) for PWRs is not permitted.

The NRC staff reviewed LAR Table 5-3, "10 CFR 50.48(c) – Applicability/Compliance References," and Attachment C, "NEI 04-02 Table B-3 – Fire Area Transition," to evaluate whether PLANT meets the feed and bleed requirements. The licensee stated in LAR Table 5-3 that feed and bleed is not utilized as the sole fire protected safe shutdown path at PLANT for any scenario. The staff verified this by reviewing the designated safe shutdown path listed in LAR Attachment C for each fire area. This review confirmed that all fire areas analyses include the safe shutdown equipment necessary to provide decay heat removal without relying on feed and bleed. In addition, all fire areas either met the deterministic requirements of NFPA 805, Section 4.2.3, or the performance-based evaluation performed in accordance with NFPA 805, Section 4.2.4, demonstrated that the integrated assessment of risk, DID, and safety margins for the fire area was acceptable. Therefore, the staff determined that based on the information provided in LAR Table 5-3 as well as the fire area analyses documented in LAR Attachment C, the licensee meets the requirements of 10 CFR 50.48(c)(2)(iii) because feed and bleed is not utilized as the sole fire-protected safe shutdown path at PLANT.

3.2.3. Assessment of Multiple Spurious Operations

NFPA 805 Section 2.4.2.2.1 "Circuits Required in Nuclear Safety Functions" states that:

> Circuits required for the nuclear safety functions shall be identified. This includes circuits that are required for operation, that could prevent the operation, or that result in the maloperation of the equipment identified in 2.4.2.1, ["Nuclear Safety Capability Systems and Equipment Selection"]. This evaluation shall consider fire-induced failure modes such as hot shorts (external and internal), open circuits, and shorts to ground, to identify circuits that are required to support the proper operation of components required to achieve the nuclear safety performance criteria, including spurious operation and signals.

In addition, NFPA 805, Section 2.4.3.2, states that the probabilistic safety assessment (PSA) evaluation shall address the risk contribution associated with all potentially risk-significant fire scenarios. Because the performance-based approach taken at PLANT utilized fire risk evaluations in accordance with NFPA 805 Section 4.2.4.2, "Use of Fire Risk Evaluation," adequately identifying and including potential multiple spurious operation (MSO) combinations is required to ensure that all potentially risk-significant fire scenarios have been evaluated.

Accordingly, the NRC staff reviewed LAR Section 4.2.1.4, "Evaluation of Multiple Spurious Operations," and Attachment F, "Fire-Induced Multiple Spurious Operations Resolution," to determine whether the licensee has adequately addressed MSO concerns at PLANT.

[Insert a detailed assessment of the licensee's MSO evaluation methodology and verify that the process used to identify circuits susceptible to MSOs is comprehensive and acceptable (draft FAQ 07-0038), including:

- *If an expert panel process used, provide an assessment of the following*
  - *Composition of the expert panel, including qualifications/background/experience*
  - *Process used by expert panel for identifying MSOs*
  - *How consensus was achieved on prioritizing MSOs for further evaluation and criteria used in decision process*
  - *List of MSOs considered by expert panel and justification for MSOs kept/eliminated for further evaluation*
- *Provide an assessment of the MSO evaluation process, including circuit analysis assumptions regarding the number of spurious actuations, the manner in which they occur (e.g., sequentially or simultaneously), and the time between spurious actuations (as supported by engineering analysis, test results, or both)*
- *NEI 04-02, Section B.2.1 provides one acceptable approach for identifying and screening MSOs*

Sample conclusion paragraph:

The NRC staff reviewed the licensee's expert panel process for identifying circuits susceptible to multiple spurious operations as described above and concludes that the licensee adopted a systematic and comprehensive process for identifying MSOs to be analyzed utilizing available industry guidance. Furthermore, the process used provides reasonable assurance that the fire risk evaluation appropriately identifies and includes risk significant MSO combinations. Based

on these conclusions, the NRC staff finds the licensee's approach for assessing the potential for MSO combinations acceptable for use at PLANT.

3.2.4. Establishing Recovery Actions

NFPA 805, Section 1.6.52, "Recovery Action," defines a recovery action as follows:

> Activities to achieve the nuclear safety performance criteria that take place outside the main control room or outside the primary control station(s) for the equipment being operated, including the replacement or modification of components.

NFPA 805, Section 4.2.3.1 states that:

> 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.

NFPA 805 Section 4.2.4, "Performance-Based Approach," states the following:

> When the use of recovery actions has resulted in the use of this approach, the additional risk presented by their use shall be evaluated.

The NRC staff reviewed LAR Section 4.2.1.3, "Transition of Operator Manual Actions to Recovery Actions," and Attachment G, "Operator Manual Actions Transition," to evaluate whether the licensee meets the associated requirements for the use of recovery actions per NFPA 805.

[*Describe the transition process documented in the LAR to identify recovery actions required for the NFPA 805 FP licensing basis. The following is sample language:]*

The licensee based its approach for transitioning operator manual actions (OMAs) into the 10 CFR 50.48(c) RI/PB FPP as recovery actions on NEI 04-02, Revision 2, Section 4.6, "Regulatory Submittal and Transition Documentation," as endorsed with exceptions by RG 1.205, Revision 1. The population of OMAs addressed during the NFPA 805 transition process at PLANT included the existing OMAs in the deterministic FPP, as well as those being added *[list the various mechanisms through which RA's were identified. For example: during the NFPA 805 transition to address MSOs and as a result development of the Fire PRA]*.

[*If the licensee proposes to include DID-RA's in the licensing basis, include the following paragraph.]* OMAs meeting the definition of a recovery action are required to comply with the NFPA 805 requirements outlined above. Some of these OMAs may not be required to demonstrate the availability of a success path in accordance with NFPA 805, Section 4.2.3.1, but may still be required to be retained in the RI/PB FPP because of the DID considerations described in Section 1.2 of NFPA 805. Accordingly, the licensee defined a DID recovery action (DID-RA) as an action that is not needed to meet the nuclear safety performance criteria, but has been retained to provide DID. In each instance, the licensee determined whether a

transitioning OMA was a recovery action, a DID-RA, or not necessary for the post-transition RI/PB FPP.

The licensee stated that it subjected all recovery actions (including DID-RAs) to a feasibility review. In accordance with the NRC-endorsed guidance in NEI 04-02, the feasibility criteria used were based on *[describe the criteria, e.g. the nine attributes provided in NFPA 805 Appendix B, Section B.5.2]*. LAR Attachment G includes Table G-1, "Feasibility Criteria – Recovery Actions and DID Recovery Actions (Based on *[insert references]*)" which lists the attributes used to assess recovery action feasibility. *[Describe the feasibility review as stated in the LAR and/or RAIs]*

Based on the above considerations, the NRC staff finds that the licensee has followed the endorsed guidance of NEI 04-02 and RG 1.205 to identify and evaluate recovery actions in accordance with NFPA 805, thereby meeting the regulatory requirements of 10 CFR 50.48(c). The staff concludes that the feasibility criteria applied to recovery actions are acceptable based on conformance with the endorsed guidance contained in NEI 04-02 *[include the following phrase only if it applies to the licensee]* and the distinction of DID actions that are necessary solely for cold shutdown conditions, where the NFPA 805 required end state is hot standby.

3.2.5. Plant Specific Treatments or Technologies *(e.g. Very Early Warning Fire Detection Systems)(*optional)

Insert the following paragraph if the licensee does not propose to include Very Early Warning Fire Detection Systems (incipient detection) in the FPP.

The licensee did not propose to use any Very Early Warning Fire Detection Systems in their FPP.

[Insert the following paragraph if the licensee does propose to include Very Early Warning Fire Detection Systems in the FPP.]

The licensee proposed the installation of several very early warning fire detection systems (VEWFDS) to monitor conditions, as well as provide indication and alarms inside key electrical cabinets at PLANT during the incipient stage of a fire. The following discussion is based on the information provided by the licensee in LAR Section 4.8.3.1 "Supplemental Information – Other Licensee Specific Issues."

[Describe the VEWFDS including: equipment selection, the purpose of the VEWFDS system, any consensus standards referenced in the LAR, any limiting design basis criteria, a system overview, determination of alert and alarm settings, operator response procedures, testing procedures, and configuration control procedures.]

The NRC staff finds the fire protection aspects related to the proposed installation of the VEWFDS at PLANT acceptable for the following reasons *[adjust as necessary]*:

- The installation of the VEWFDS at PLANT will be performed in accordance with the appropriate NFPA codes and the equipment manufacturers' requirements.

- The VEWFDS will be properly tested during commissioning such that the alert and alarm triggers will be set to provide an appropriate level of sensitivity without unnecessary nuisance or spurious alarms.

- The PLANT configuration and design control process will control and maintain the setpoints for both alert and alarm functions from the VEWFDS.

- The VEWFDS equipment will be periodically tested and maintained in accordance with the *[insert title of testing reference]* requirements.

- First responders to VEWFDS indications will be trained in the use of fire extinguishers and instructed to suppress or control a fire that breaks out in the alarming cabinet.

- The licensee's procedure will require the first responders to [*describe the response action]* until the degrading component is repaired, the cabinet is de-energized, or the alarm is satisfactorily reset.

In addition, the PLANT Fire PRA modeled the installation of the VEWFDS and took credit for its use in assessing the risk of various fire areas during certain scenarios. Section 3.4 of this safety evaluation addresses the technical review of the treatment of the VEWFDS in the PLANT Fire PRA, as well as the acceptability of the risk credit taken for the associated fire areas.

3.2.6. Conclusion for Section 3.2

The NRC staff reviewed the licensee's LAR, as supplemented, for conformity with the requirements contained in NFPA 805, Section 2.4.2, regarding the process used to perform the nuclear safety capability assessment at PLANT. First, the staff found that the safe and stable condition, proposed by the licensee, is acceptable. Second, the staff found that the licensee's process is adequate to appropriately identify and locate the systems, equipment, and cables required to provide reasonable assurance of achieving and maintaining the fuel in a safe and stable condition, as well as to meet the nuclear safety performance criteria of NFPA 805, Section 1.5.

The staff verified, through review of the documentation provided in the LAR, that feed and bleed was not the sole fire-protected safe shutdown path for maintaining reactor coolant inventory, pressure control, and decay heat removal capability, in accordance with 10 CFR 50.48(c)(2)(iii).

The staff reviewed the licensee's process to identify and analyze MSOs. Based on the information provided in the LAR, as supplemented, the process used to identify and analyze MSOs at PLANT is considered comprehensive and thorough. Through the use of *[describe the MSO evaluation process]*, potential MSO combinations were identified and included as necessary into the NSCA as well as the applicable fire risk evaluations. The staff also considers the licensee's approach for assessing the potential for MSO combinations to be acceptable because it was performed in accordance with NRC-endorsed guidance.

The staff found that, based on the information provided in the LAR, as supplemented, the process used by the licensee to review, categorize and address recovery actions during the transition from the existing deterministic fire protection licensing basis to a RI/PB FPP is consistent with the NRC-endorsed guidance contained in NEI 04-02 and RG 1.205, regarding the identification of recovery actions and other actions required to be taken at a primary control

station. Therefore, this process meets the regulatory requirements of 10 CFR 50.48(c) and NFPA 805.

[If needed] The licensee proposed the installation of a VEWFDS to monitor conditions in certain key electrical cabinets at PLANT. Based on the information provided in the LAR, as supplemented, the staff found that the fire protection aspects of the proposed VEWFDS installation are acceptable because the installation will be done in accordance with appropriate NFPA codes, [list other key attributes of the system design and implementation program].

[Include a summary paragraph similar to the one above for other plant specific treatments or technologies.]

3.3. Fire Modeling

NFPA 805 allows the use of fire modeling as a performance-based alternative to the deterministic approach outlined in the standard. NFPA 805, Section 1.6.18, defines a fire model as a "mathematical prediction of fire growth, environmental conditions, and potential effects on structures, systems, or components based on the conservation equations or empirical data."

NFPA 805, Section 2.4.1, "Fire Modeling Calculations," specifically addresses the application requirements for using performance-based fire models as follows:

NFPA 805, Section 2.4.1.2.1, **"**Acceptable Models," states the following:

> Only fire models that are acceptable to the authority having jurisdiction shall be used in fire modeling calculations.

NFPA 805, Section 2.4.1.2.2, "Limitations of Use," states the following:

> Fire models shall only be applied within the limitations of that fire model.

NFPA 805, Section 2.4.1.2.3, "Validation of Models," states the following:

> The fire models shall be verified and validated.

NFPA 805, Section 4.2.4.1, "Use of Fire Modeling," identifies the specific approach for use of fire modeling as a performance-based method, including the following required aspects: identify targets, establish damage thresholds, determine limiting condition(s), establish fire scenarios, protection of required nuclear safety success path(s), and operations guidance.

In addition, RG 1.205, Revision 1 (Reference X), Regulatory Position C.4.2 and NEI 04-02, Revision 2 (Reference X), Section 5.1.2, "Fire Modeling Considerations," provide guidance by identifying fire models that are considered acceptable for use by the NRC for plants transitioning to a RI/PB FPP in accordance with NFPA 805 and 10 CFR 50.48(c).

The NRC staff reviewed LAR Section 4.5.2, "Performance-Based Approaches," which describes how the licensee used fire modeling as part of the transition to NFPA 805 at PLANT, and LAR Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA 805," which describes how the licensee performed fire modeling calculations in compliance with the NFPA 805 performance-based evaluation quality requirements for fire protection systems and features

at PLANT, to determine whether the fire modeling used to support transition to NFPA 805 is acceptable.

In LAR Section 4.5.2, the licensee stated that *[describe the extent to which fire modeling was used. If fire modeling was used to support fire risk evaluations, include the following cross-reference:]* The licensee utilized the fire risk evaluation performance-based method (i.e. Fire PRA) with input from fire modeling analyses. Therefore, the NRC staff reviewed the technical adequacy of the PLANT Fire PRA, including the supporting fire modeling analyses, as documented in Section 3.4.1 of this safety evaluation, to evaluate compliance with the nuclear safety performance criteria.
[If the licensee did not use fire modeling to support compliance with NFPA 805 Section 4.2.4.1, include the following paragraph:]

The licensee did not propose any fire modeling methods to support performance-based evaluations in accordance with NFPA 805, Section 4.2.4.1, as the sole means for demonstrating compliance with the nuclear safety performance criteria. Therefore, the NRC staff has not reviewed any such methods for acceptability in that context. Since the staff has not reviewed any such fire modeling methods, the staff does not find any plant-specific fire modeling methods acceptable for use to support compliance with NFPA 805, Section 4.2.4.1, as part of this licensing action supporting the transition to NPFA 805 at PLANT.

[If the licensee did use fire modeling to support compliance with NFPA 805 Section 4.2.4.1, describe the modeling techniques used, including the validation and verification of the models. Describe the attributes of the performance-based method including in the subsections listed below. Provide an evaluation of the fire models.]

3.3.1.1 Target Identification
3.3.1.2 Damage Thresholds
3.3.1.3 Limiting Conditions
3.3.1.4 Fire Scenarios
3.3.1.5 Operations Guidance
3.3.1.6 Protection of Required Nuclear Safety Success Paths
3.3.1.7 Defense in Depth
3.3.1.8 Safety Margins
3.3.1.9 Verification and Validation of Fire Models

3.4. Fire Risk Assessments

This section addresses the licensee's fire risk evaluation performance-based method, which is based on NFPA 805 Section 4.2.4.2. The licensee chose to use only the fire risk evaluation performance-based method in accordance with NFPA 805, Section 4.2.4.2. *[delete this sentence if the licensee used 4.2.4.1 fire modeling.]* The fire modeling performance-based method of NFPA 805 Section 4.2.4.1 was not used for this application.

NFPA 805, Section 4.2.4.2, "Use of Fire Risk Evaluations," states the following:

> Use of fire risk evaluation for the performance-based approach shall consist of an integrated assessment of the acceptability of risk, DID, and safety margins.
>
> The evaluation process shall compare the risk associated with implementation of the deterministic requirements with the proposed alternative. The difference in risk between

the two approaches shall meet the risk acceptance criteria described in NFPA 805, Section 2.4.4.1 ["Risk Acceptance Criteria"]. The fire risk shall be calculated using the approach described in NPFA 805, 2.4.3 ["Fire Risk Evaluations"].

3.4.1. Quality of the Fire Probabilistic Risk Assessment

In reviewing a risk-informed LAR, the NRC staff evaluates the validity of the plant-specific PRA models and their application as proposed in the LAR. The objective of the PRA quality review is to determine whether the plant-specific PRA used in evaluating the proposed LAR is of sufficient scope, level of detail, and technical adequacy for the application. The staff evaluated the PRA quality information provided by the licensee in its NFPA 805 submittal, as supplemented, including industry peer review results and self assessments performed by the licensee. The NRC staff reviewed LAR Section 4.5.1, "Fire PRA Development and Assessment," Section 4.7, "Program Documentation, Configuration Control, and Quality Assurance," Attachment C, "NEI 04-02 Table B-3 – Fire Area Transition," Attachment U, "Internal Events PRA Quality," Attachment V, "Fire PRA Quality," and Attachment W, "Fire PRA Insights."

The licensee developed its Fire PRA model using the guidance of NUREG/CR-6850, "EPRI/NRC-RES, Fire PRA Methodology for Nuclear Power Facilities" (Reference X). The model addresses both Level 1 (core damage frequency) and partial Level 2 (i.e., large early release frequency only) PRA during at-power conditions. The licensee also modified its internal events PRA model to capture the effects of fire, both as the initiator of an event and to characterize the subsequent potential failure modes for affected circuits or individual plant SSCs (targets), including fire-affected human actions.

The licensee did not identify any (1) known outstanding plant changes that would require a change to the Fire PRA model, or (2) any planned plant changes that would significantly impact the PRA model, beyond those identified and scheduled to be implemented as part of the transition to a FPP based on NFPA 805. Therefore, the NRC staff finds that the Fire PRA model for PLANT represents the as-built, as-operated and maintained plant as it will be configured after full implementation of NFPA 805.

The licensee identified administrative controls and processes used to maintain the Fire PRA model current with plant changes and to evaluate any outstanding changes not yet incorporated into the PRA model for potential risk impact as a part of the routine change evaluation process. Further, as described in Section 3.8.3 of this safety evaluation, the licensee has a program for ensuring that developers and users of these models are appropriately trained and qualified.

Internal Events PRA Model

The licensee evaluated the technical adequacy of the portions of its internal events PRA model used to support development of the Fire PRA model by [***Insert*** *a description of the processes applied]* using the internal events standard and RG 1.200 Rev. 2 (Reference X). *[For example, the processes may be:*

1) A peer review of the internal events model using the industry guidance along with a self assessment of the gap analysis using the internal events standard and RG 1.200, or

2) A full peer review using the internal events standard and RG 1.200.]

In addition, if upgrades to the internal events PRA model occurred subsequent to these reviews, a focused scope peer review of the affected portions of the PRA model is required by the internal events standard, and should be addressed.]

***[Insert** staff disposition of the results of the above internal events PRA reviews and assessments]*

The staff concern is the appropriate disposition of the open significant findings from the peer reviews and self assessments for this specific application. The SER needs to address all open findings and any departures from capability category II of the internal events standard. In addition, the staff may find that capability category III is required for some elements, and this may also have to be addressed. The staff may also review closed findings during the onsite audit, and any issues arising from this may be required to be addressed. Where significant numbers of items exist, related items may be grouped and characterized for disposition. Note that documentation issues may be relevant since NFPA 805 adoption requires ongoing quality of the PRA model to support the fire program, therefore deficiencies in documentation could result in long term degradation of model technical adequacy. The SER should find that the disposition of all open items is sufficient to conclude that the internal events PRA is technically adequate to support the NFPA 805 application, including any risk-informed self-approval of future plant changes.

The following is sample language.

The licensee stated in the LAR that the internal events PRA model was assessed to capability category II of the standard. The licensee also stated in the LAR that all facts and observations (F&Os) from the peer review were resolved and that the additional scope of work identified by the self assessment was completed.

The licensee identified the resolution of the F&Os from the peer review in LAR Attachment V. The licensee addressed all of the F&Os through either a PRA model change or a specific disposition applicable to this licensing action. Table 3.4-1, "Internal Events Findings and Observations Resolution," in Attachment C of this safety evaluation summarizes the NRC staff's review of the licensee's resolution of the F&Os and those supporting requirements evaluated as less than capability category II without any specific F&O.

Fire PRA Model

The licensee evaluated the technical adequacy of the PLANT Fire PRA model by conducting a peer review of the Fire PRA model using the fire PRA standard and RG 1.200, Revision 2.

*[**Insert** the staff disposition of the results of the above fire PRA peer review. As with the internal events reviews, the staff concern is the appropriate disposition of the open significant findings for this specific application. The SER needs to address all open findings and any departures from capability category II of the standard. In addition, the staff may find that capability category III is required for some elements, and this may also have to be addressed. The staff may also review closed findings during the onsite audit, and any issues arising from this may be required to be addressed. Where significant numbers of items exist, related items may be grouped and characterized for disposition. Note that documentation issues may be relevant since NFPA 805 adoption requires ongoing quality of the PRA model to support the fire program, therefore deficiencies in documentation could result in long term degradation of model technical adequacy. The SER should find that the disposition of all open items is sufficient to conclude*

that the fire PRA is technically adequate to support the NFPA 805 application, including any risk-informed self-approval of future plant changes.]

Table 3.4-2, "Fire PRA Findings and Oservations Resolution," in Attachment C of this safety evaluation summarizes the NRC staff's review of the licensee's resolution of the F&Os. As a result of this review and the supplemental information provided, the NRC staff concludes that the PLANT Fire PRA meets the PRA standard at the capability categories stated by the licensee.

Insert Title of Plant Specific Treatment or Technology [i.e. Incipient Fire Detection Credit]

This subsection is a placeholder for plant-specific treatments or technologies that are important to the regulatory decision. For example, incipient fire detection credit in the fire PRA. Include this section only if the licensee proposes to use an plant specific treatment or technology and take credit for it in the PRA. Describe the approach used to model the plant –specific treatment or technology in the FPRA. Provide an evaluation of the approach]

Conclusions Regarding Fire PRA Quality

The NRC staff finds that the technical adequacy and quality of the PLANT PRA is sufficient for the fire risk evaluations that support the proposed license amendment because (1) the PRA models conform to the applicable industry PRA standards for internal events and fires at an appropriate capability category, considering the acceptable disposition of the review findings, (2) the fire modeling used to support the development of the PLANT Fire PRA has been confirmed as appropriate and acceptable, and (3) the PRA models represent the as-built, operated and maintained plant as it will be configured at full implementation of NFPA 805.

In addition, the licensee's PRA satisfies the guidance in RG 1.174, Sections 2.2.3 and 2.5 (Reference X), regarding quality of the PRA analysis and quality assurance; RG 1.205 Section 4.3, (Reference X), regarding fire PRA; and NUREG-0800, Section 19.2 (Reference X), regarding the review of risk information used to support permanent plant-specific changes to the licensing basis, which further supports the NRC staff's conclusion that the PLAN PRA is technically adequate and of sufficient quality to allow transition to NFPA 805.

Finally, based on the licensee's administrative controls to maintain the PRA models current and assure continued quality, using only qualified staff and contractors (as described in Section 3.8.3 of this safety evaluation), the NRC staff finds that the quality of the PLANT PRA is sufficient to support self-approval of future risk-informed changes to the FPP under the NFPA 805 license condition following the implementation of the plant modifications that are credited in the PRA (the license condition includes the plant modifications credited in the PLANT PRA).

[In the case that a key plant-specific treatment or technology must be installed to for the PRA to match the as-built, as operated and maintained plant, use the following paragraph:]
However, until the *[insert plant-specific technology or treatment]* modeling in the PLANT Fire PRA is modified to be consistent with the approved methods, the licensee may not make more than minimal risk-informed changes without prior NRC review and approval for those fire areas crediting *[insert plant-specific technology or treatment]*, as discussed above and included as a restriction in the PLANT NFPA 805 license condition.

3.4.2. Defense-in-Depth and Safety Margins

NFPA 805, Section 4.2.4.2, requires that 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."

Defense-in-Depth

As a supplement to the definition of defense-in-depth provided in NFPA 805, Section 1.2, the NRC-endorsed guidance in NEI 04-02, Revision 2 (Reference X), states the following:

> In general, the defense-in-depth requirement is satisfied if the proposed change does not result in a substantial imbalance in:
>
> - Preventing fires from starting
> - Detecting fires quickly and extinguishing those that do occur, thereby limiting fire damage
> - Providing an 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 addition, NEI 00-01, Revision 2 (Reference X), provides the following guidance with respect to maintaining defense-in-depth.

> Consistency with the defense-in-depth philosophy is maintained if the following acceptance guidelines, or their equivalent, are met:
>
> 1. A reasonable balance is preserved among 10 CFR 50 Appendix R defense-in-depth elements.
> 2. Over-reliance on, and permitting increased length of time or risk in performing programmatic activities to compensate for weaknesses in plant design, is avoided.
> 3. 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 train must be maintained free of fire damage.)
> 4. Independence of defense-in-depth elements is not degraded.
> 5. Defenses against human errors are preserved.
> 6. The intent of the General Design Criteria in Appendix A to 10 CFR Part 50 is maintained.

The NRC staff reviewed LAR Section 4.8.1, "Required Fire Protection Systems," and LAR Table 4-3, "Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features," as well as the associated supplemental information, in order to determine whether the principles of defense-in-depth were maintained in regard to the planned transition to NFPA 805 at PLANT.

When implementing the performance-based approach, the licensee followed the guidance in contained in Section 5.3, "Plant Change Process," of NEI 04-02, which includes a detailed consideration of defense-in-depth and safety margins as part of the change process. The license documented the method used to meet the DID requirements of NFPA 805 in LAR Table 4-3. For each of the major fire protection DID attributes, the licensee provided several examples of how that attribute was addressed, along with a discussion of the considerations used in evaluating that element.

[Describe the process used by the licensee to identify variances from the deterministic requirements (VFDRs) of NFPA 805 Chapter 3 and how the licensee factored DID into the evaluation of those VFDRs. As appropriate, indicate that the fire protection systems and features were also considered in the DID review process. Describe any DID considerations that apply to the NFPA 805 Monitoring Program.]

LAR Tables 4-3, documents the results of the licensee's review of fire suppression and fire detection systems at PLANT.

Safety Margins

Although not a part of the regulations, Section A.2.4.4.3 of Appendix A to NFPA 805, provides the following background related to the meaning of the term "safety margins:"

> An example of maintaining sufficient safety margins occurs when the existing calculated margin between the analysis and the performance criteria compensates for the uncertainties associated with the analysis and data. Another way that safety margins are maintained is through the application of codes and standards. Consensus codes and standards are typically designed to ensure such margins exist."

LAR Section 4.5.2, "Performance-Based Approaches," states that safety margins were considered as part of the transition process. Section 4.5 states that the licensee evaluated each variance from the deterministic requirements against the safety margin criteria contained in NEI 04-02 and RG 1.205.

NEI 04-02 Section 5.3.5.3, "Safety Margins," lists two specific criteria that should be addressed when considering the impact of plant changes on safety margins:

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

[Discuss the licensee's review of SM for performance-based fire areas and provide an evaluation of the reviewed material.]

Based on the statements provided in LAR Section 4.5.2, and on the NRC staff observations of the detailed implementation of the actions described in these sections, the staff finds that the licensee adequately addressed the issue of safety margins in the plant change and fire risk evaluation processes. The licensee either used appropriate codes and standards (or alternatives accepted for use by the NRC), met the safety analyses acceptance criteria in the licensing basis (e.g., FSAR, supporting analyses, etc.), or provided sufficient margin to account for analysis and data uncertainty.

Based on the information provided by the licensee in the LAR, the transition process included a detailed review of fire protection DID and SM. The results of the licensee's DID and SM review are documented in *[insert the location of the review results]*. The NRC staff finds the documentation in regard to DID and SM to be acceptable because the licensee's process and results follow the endorsed guidance in NEI 04-02, Revision 2, and are consistent with the staff guidance in RG 1.205, Revision 1. Section 3.5 of this SE discusses the results of the individual fire area reviews, including the documentation of the required suppression and detection systems.

3.4.3. Fire Risk Evaluations

The staff reviewed the following information during its evaluation of PLANT's fire risk evaluations *[eliminate any that do not apply]*:

- LAR Section 4.5.1, "Fire PRA Development and Assessment"
- LAR Section 4.5.2, "Performance Based Approaches"
- LAR Attachment U, "Internal Events PRA Quality"
- LAR Attachment V, "Fire PRA Quality"
- LAR Attachment W, "Fire PRA Risk Insights"
-

The licensee identified the following X types of VFDRs that it does not intend to bring into deterministic compliance under NFPA 805, and for which the licensee performed evaluations using the risk-informed approach, in accordance with NFPA 805, Seton 4.2.4.2, to address FPP non-compliances and demonstrate that the VFDRs are acceptable:

1. *[list the types of VFDRs]*

[If needed. Modify the justification for exclusion of certain VFDR's as appropriate on a plant-specific basis] In addition to the above, the licensee also identified separation issues associated with *[describe the issue/affected systems]*. However, as discussed in Section 3.2.4 of this SE, issues related to *[describe the issue/affected systems]* do not constitute VFDRs since (1) the scenario could be mitigated with control room and/or *[insert alternate or dedicated shutdown strategy]* actions, and (2) actions required to address *[describe the issue]* are not considered recovery actions. Accordingly, the NRC staff finds the licensee's disposition of the issues related to *[describe the issue/affected systems]* acceptable.

[Discuss any performance-based evaluations of wrapped or embedded cables with respect to the modeling of the VFDR in the PRA]

The NRC staff finds that the licensee's methods for calculating the change in risk associated with *[list the types of VFDRs]* that do not satisfy the deterministic requirements of NFPA 805, are acceptable because they correctly model the physical configuration of the plant and the impact on fire risk due to *[describe the unmet requirement]*. In addition, the results of these calculations demonstrate that the difference between the risk associated with implementation of the deterministic requirements and that of the VFDRs meets the risk acceptance criteria described in NFPA 805, Section 2.4.4.1, which the NRC staff finds acceptable.

3.4.4. Additional Risk Presented by Recovery Actions

The NRC staff reviewed LAR Attachment C, "NEI 04-02 Table B-3 – Transition," Attachment G, "Operator Manual Actions Transition," and Attachment K, "Existing Licensing Action Transition," during its evaluation of the additional risk presented by the NFPA 805 recovery actions at PLANT. Section 3.2.4 of this SE describes the identification and evaluation of recovery actions.

For those fire areas for which the licensee used a performance-based approach to meet the nuclear safety performance criteria, the licensee used fire risk evaluations in accordance with NFPA 805 Section 4.2.4.2 to demonstrate the acceptability of the plant configuration. Plant configurations that did not meet the separation requirements of NFPA 805, Section 4.2.3.1 were considered VFDRs. The licensee evaluated each VFDR for risk impact by comparing it to a hypothetically compliant plant configuration, and the additional risk was summed for each fire area and compared to the acceptance criteria contained in RG 1.174.

With the exception of the plant fire areas that used an alternative shutdown (ASD) strategy [*or* dedicated shutdown strategy] (e.g., the main control room and the control complex), the additional risk associated with VFDRs is calculated *[describe the calculation process and provide an evaluation of the process. If the process is found to be conservative overall, the following is sample conclusion language]*. A conservative estimate of the change in risk associated with a risk-informed change is acceptable as described in RG 1.174. Therefore, the NRC staff accepts this approach for conducting the risk-informed comparison between the deterministic and proposed performance-based requirements, as described in Section 4.2.4.2 of NFPA 805

The licensee addressed those fire areas that utilized a previously approved ASD [*or* dedicated] strategy differently. For these areas, the licensee utilized the guidance in RG 1.205, Revision 1 for addressing recovery actions. This included consideration of primary control station (PCS) and the definition of recovery action, as clarified in the RG 1.205, Revision 1. Accordingly, any actions required to transfer control to, or operate equipment from, the PCS, while required as part of the RI/PB FPP, were not considered recovery actions per the RG 1.205 guidance and in accordance with NFPA 805. Alternatively, any OMAs required to be performed outside the control room and not at the PCS were considered recovery actions.

The licensee addressed the additional risk of the recovery actions associated with an approved ASD *[or dedicated shutdown strategy]*, which take place in response to fire-induced failures for *[insert number of areas]* fire areas, using *[describe the calculation process]*. These *[insert number of areas]* fire areas are *[list the fire areas]*. [In the bulleted list below, describe the calculation performed for each fire area]

- The additional risk associated with recovery actions performed as a result of postulated fire damage in Fire Area *[or zone]* XX-X-XXX was determined *[insert a description of the calculation]*.

Section 3.5 of this SE discusses and evaluates each individual recovery action. In addition, the NRC staff reviewed the results of the licensee's calculations associated with the additional risk of recovery actions and finds that the approaches applied are acceptable because *[describe the basis for acceptability (i.e. the approach conservatively estimates risk)]*.

3.4.5. Risk-Informed or Performance-Based Alternatives to Compliance with NFPA 805

*[If the licensee did not utilize 10 CFR 50.48(c)(4) include the following:]*The licensee did not utilize any risk-informed or performance-based alternatives to compliance with NFPA 805, which falls under the requirements of 10 CFR 50.48(c)(4), at PLANT.

[If the licensee did utilize 10 CFR 50.48(c)(4) describe the plant configuration, the method used and an evaluation of the basis for acceptability.]

3.4.6. Cumulative Risk and Combined Changes

The licensee identified the planned NFPA 805 transition modifications that decrease risk and for which the licensee takes credit during the assessment of the cumulative risk impact of the transition to NFPA 805 at PLANT. LAR Attachment R, as summarized in SE Section 2.8.1, indicates that these modifications will be complete by the end of Refueling Outage XX, which is currently scheduled to begin MONTH DAY, YEAR. The licensee will maintain appropriate compensatory measures, as necessary, for any outstanding plant modifications related to NFPA 805 until the completion of all of the NFPA 805 transition modifications.

The licensee credited the risk reductions that will be afforded by these modifications in its evaluation of the total change in risk associated with transition to NFPA 805. In addition, *[list any modifications that will affect the internal events risk model as well as the fire model]* provide risk reductions for internal events, as well as for fires. These risk reductions are included in the total internal events risk reported below.

[If needed, fill in Table 3.4-5 in Attachment C of this SE and insert a cross reference to the table here. Table 3.4-5 captures the staff evaluation of licensee responses to RAIs related to the licensee's fire risk evaluations.]

The licensee reported in the LAR, as supplemented, the total CDF and total LERF which were estimated by adding the risk assessment results for internal events and fire. Note that neither seismic risk nor other external hazards risks are significant for PLANT, and are therefore not addressed in the individual risk assessments or the associated totals. The CDF and LERF results are summarized in Table 3.4.6-1.

Table 3.4.6-1: CDF and LERF for PLANT After Transition to NFPA 805

Hazard Group	CDF	LERF
Internal Events	X.XXE-X	X.XXE-X
Fires	X.XXE-X	X.XXE-X
TOTAL	X.XXE-X	X.XXE-X

The total CDF after implementation of NFPA 805 remains below 1E-4/year, and the total LERF remains below 1E-5/year, which is within the risk acceptance guidelines of RG 1.174.

[If seismic or other external hazards are significant to the plant risk, describe the affect here with respect to the RG 1.174 acceptance guidelines.]

The licensee also provided the ΔCDF and ΔLERF estimated for each fire area at PLANT that is not deterministically compliant, in accordance with NFPA 805, Section 4.2.3, "Deterministic Approach." The risk estimates for these fire areas result from the completed and planned modifications that will be implemented as part of the transition to NFPA 805 at PLANT. The ΔCDF and ΔLERF results by fire area are summarized in Table 3.4.6-2.

Table 3.4.6-2: ΔCDF and ΔLERF for PLANT After Transition to NFPA 805

Fire Area	ΔCDF (/year)	ΔLERF (/year)
XX-X-XXX	X.XXE-X	X.XXE-X
TOTAL	X.XXE-X	X.XXE-X

* *[if applicable]* For conservatism, total risk is reported for all control room abandonment scenarios instead of the change in risk.

Each of the individual fire area changes in risk for CDF and LERF fall into Region III (very small change) of the RG 1.174 acceptance guidelines, except for the ΔCDF for Fire Area *[or zone]* XX-X-XXX, *[insert name of area or zone]*, which is just slightly above the threshold for entering Region II (small change). *[If needed:]*The risk associated with control room abandonment for Fire Area *[or zone]* XX-X-XXX is reported as *[summarize the calculation method]*, and still falls within Region III (very small change).

Based on the results of the licensee's fire risk assessments, as summarized above, the risk increase for each fire area associated with transition to NFPA 805 at PLANT, as well as the cumulative change in risk for all fire areas subject to a performance-based approach, is within the RG 1.174 risk acceptance guidelines of 1E-5/yr ΔCDF and 1E-6/yr ΔLERF for small changes. In addition, the total CDF will remain below 1E-4/yr and total LERF will remain below 1E-5/yr. Therefore, the NRC staff finds the risk associated with the proposed alternatives to compliance with the deterministic criteria of NFPA 805 acceptable for the purposes of this application, in accordance with NFPA 805, Section 2.4.4.1. Additionally, the NRC staff finds that the licensee has satisfied RG 1.174, Sections 2.2.4 and 2.2.5, and NUREG-0800, Section 19.2 regarding acceptable risk.

3.4.7. Uncertainty and Sensitivity Analyses

The licensee identified the key assumptions and sources of uncertainty that potentially impact the risk analyses which support its LAR to transition to NFPA 805, and provided its evaluation of the sensitivity of the risk results to these issues. Table 3.4-6, "Uncertainty and Sensitivity Issues," in Attachment C to this SE, provides a summary of the issues identified and the staff's evaluation of the impact on the risk analyses.

[Describe any issues that are particularly important to the regulatory decision. Include an NRC staff evaluation of the licensee's analyses]

The licensee applied a reasonable approach for identification of key assumptions and sources of uncertainty that could potentially impact the risk analyses related to NFPA 805. The licensee demonstrated that most assumptions are conservative; thereby assuring that the existing risk analyses reasonably bound any uncertainty. In addition, more realistic assumptions are applied appropriately when justified by plant-specific configurations and available data. Accordingly, the NRC staff concludes that the licensee's risk evaluations are reasonable and conservative, and not significantly impacted by the specific modeling assumptions made by the licensee.

3.4.8. Conclusion for Section 3.4

Based on the information provided by the licensee in the LAR, as supplemented, regarding the fire risk assessment methods, tools, and assumptions used to support transition to NFPA 805 at PLANT, the NRC staff finds the following:

- The licensee's PRA used to perform the risk assessments in accordance with NFPA 805, Section 2.4.4 (plant change evaluations) and Section 4.2.4.2 (fire risk evaluations), is of sufficient quality to support the application to transition the PLANT FPP to NFPA 805. In accordance with NFPA 805 Section 2.4.3.3, the NRC staff finds the PRA approach, methods, tools and data acceptable. In addition, the underlying PRA (i.e., the baseline model) is technically sound, and the analyses, assumptions, and approximations used to map the cause-effect relationship associated with the application are technically adequate.

- The transition process included a detailed review of fire protection DID and SM as required by NFPA 805. The NRC staff finds the licensee's documentation on DID and SM to be acceptable. The licensee's process followed the NRC-endorsed guidance in NEI 04-02, Revision 2, and is consistent with the approved NRC staff guidance in RG 1.205, Revision 1, which provides an acceptable approach for meeting the requirements of 10 CFR 50.48(c).

- The changes in risk (i.e., ΔCDF and ΔLERF) associated with the proposed alternatives to compliance with the deterministic criteria of NFPA-805 (fire risk evaluations) are acceptable for the purposes of this application, and that the licensee has satisfied the guidance contained in RG 1.205, Revision 1, RG 1.174, Sections 2.2.4 and 2.2.5, and NUREG-0800, Section 19.2, regarding acceptable risk. By meeting the guidance contained in these approved regulatory documents, the changes in risk have been found to be acceptable to the AHJ, and therefore meet the requirements of NFPA 805.

- The licensee's process to identify recovery actions required to demonstrate the availability of a success path necessary to meet the nuclear safety performance criteria is acceptable. The risk presented by the use of these recovery actions was determined and provided in accordance with the guidance in RG 1.205, Revision 1, and NFPA 805, Section 4.2.4. The NRC staff found that the risk of ~~the~~ each NFPA 805 recovery action~~s~~ is acceptable because the risk for each fire are [or zone] that relies on a recovery action is~~it was~~ below the acceptance criteria in RG 1.205, Revision 1, and RG 1.174. Additionally, the cumulative risk of the bundled plant changes for NFPA 805 transition,

including all the recovery actions, is also below the acceptance criteria in RG 1.205, Revision 1, and RG 1.174.

- The licensee did not utilize any risk-informed or performance-based alternatives to compliance to NFPA 805 which fall under the requirements of 10 CFR 50.48(c)(4).

- The licensee's application to transition to NFPA 805 is a combined change, as defined by RG 1.205, Revision 1, *[describe the cumulative effects of the risk evaluations. The following is sample language:]* which includes risk increases identified in the fire risk evaluations with risk decreases resulting from modifications that include reductions in risk associated with the internal events PRA. Based on the combination of these risk values, the changes associated with NFPA 805 meet the guidance contained in RG 1.205, Regulatory Position 3.2.5, related to meeting the requirements for cumulative risk and combined plant changes.

3.5. Nuclear Safety Capability Assessment Results

NFPA 805, Section 2.2.3, "Evaluating Performance Criteria" states the following:

> To determine whether plant design will satisfy the appropriate performance criteria, an analysis shall be performed on a fire area basis, given the potential fire exposures and damage thresholds, using either a deterministic or performance-based approach.

NFPA 805, Section 2.2.4, "Performance Criteria" states the following:

> The performance criteria for nuclear safety, radioactive release, life safety, and property damage/business interruption covered by this standard are listed in Section 1.5 and shall be examined on a fire area basis.

NFPA 805, Section 2.2.7, "Existing Engineering Equivalency Evaluations" states:

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

3.5.1. Nuclear Safety Capability Assessment Results by Fire Area

NFPA 805, Section 2.4.2, "Nuclear Safety Capability Assessment," states the following:

> The purpose of this section is to define the methodology for performing a nuclear safety capability assessment. The following steps shall be performed:
>
> (1) Selection of systems and equipment and their interrelationships necessary to achieve the nuclear safety performance criteria in Chapter 1
>
> (2) Selection of cables necessary to achieve the nuclear safety performance criteria in Chapter 1

(3) Identification of the location of nuclear safety equipment and cables

(4) Assessment of the ability to achieve the nuclear safety performance criteria given a fire in each fire area

This section of the safety evaluation addresses the last topic regarding the ability of each fire area to meet the nuclear safety performance criteria of NFPA 805. Section 3.2.1 of this safety evaluation addresses the first three topics.

NFPA 805, Section 2.4.2.4," Fire Area Assessment," also states the following:

> An engineering analysis shall be performed in accordance with the requirements of Section 2.3 for each fire area to determine the effects of fire or fire suppression activities on the ability to achieve the nuclear safety performance criteria of Section 1.5.

In accordance with the above, the process defined in NFPA 805, Chapter 4, provides a framework to select either a deterministic or a performance-based approach to meet the nuclear safety performance criteria (NSPC). Within each of these approaches, additional requirements and guidance provide the information necessary for the licensee to perform the engineering analyses necessary to determine which fire protection systems and features are required to meet the NSPC of NFPA 805.

NFPA 805, Section 4.2.2, "Selection of Approach," states the following:

> For each fire area either a deterministic or performance-based approach shall be selected in accordance with Figure 4.2.2. Either approach shall be deemed to satisfy the nuclear safety performance criteria. The performance-based approach shall be permitted to utilize deterministic methods for simplifying assumptions within the fire area.

This section of the SE evaluates the approach used to meet the NSPC on a fire area basis, as well as what fire protection features and systems are required to meet the NSPC.

The NRC staff reviewed LAR Section 4.2.4, "Fire Area-by-Fire Area Transition," Section 4.8.1, "Results of the Fire Area-by-Fire Area Review," Attachment C, "NEI 04-02 Table B-3 – Fire Area Transition," Attachment G, "Operator Manual Actions Transition," Attachment S, "Plant Modifications and Items to be Completed During Implementation" and Attachment W, "Fire PRA Insights," during its evaluation of the ability of each fire area to meet the nuclear safety performance criteria of NFPA 805.

PLANT is divided into *[insert number]* *[insert the basis. i.e. fire area, fire zone, etc.]*. Based on the information provided by the licensee in the LAR, as supplemented, the licensee performed the nuclear safety capability assessment on a *[insert the basis]* basis for each of the *[insert number]* *[insert the basis]*. LAR Attachment C provides the results of these analyses on a *[insert the basis]*. For each *[insert the basis]*, the licensee documented the following:

The licensee also performed a detailed analysis of fire protection defense-in-depth with respect to fire detection and fire suppression systems for each fire area. LAR Section 4.8.4 includes a detailed listing of the fire areas, fire zones, and fire protection features necessary to meet the

requirements of NFPA 805. LAR Table 4-3, "Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features," provides a detailed listing of the fire areas and fire zones at PLANT, as well as an indication of whether automatic fire suppression systems are installed in these areas. Table 4-3 also provides a detailed listing of the fire areas and fire zones at PLANT, as well as an indication of whether automatic fire detection systems are installed in these areas. The tables identify those fire areas/zones where automatic suppression and detection systems are required and list the regulatory and/or technical issue that makes the system required.

Table 3.5.1-1 of this safety evaluation identifies and briefly describes each fire area at PLANT. SE Table 3.5.1-1 is based on LAR Table 4-5, "Fire Area Compliance Summary," which was provided by the licensee in LAR Section 4.8, "Summary of Results."

SE Table 3.5.1-1 also identifies the NFPA 805 compliance basis for each fire area, as well as the change in risk associated with CDF and LERF, as identified by the licensee. The detailed discussion for each fire area, including the NRC staff's evaluation of the licensee's compliance with the applicable requirements, is contained in Attachment D, "Nuclear Safety Capability Assessment Results by Fire Area," to this safety evaluation.

Attachment D of this SE is broken down into those fire areas that were analyzed using the deterministic approach in accordance with NFPA 805 Section 4.2.3 and those areas using the performance-based approach in accordance with NFPA 805 Section 4.2.4.

In Attachment D, each fire area includes a discussion of how the licensee met the requirement to evaluate the fire suppression effects on the ability to meet the NSPC.

Table 3.5.1-1: PLANT Fire Area and Compliance Strategy Summary

Fire Area	Fire Area Description	Licensing Actions Credited?	NFPA 805 Compliance Basis	Fire Area Delta Risk	
				ΔCDF	ΔLERF
X-XX-X	*Brief description of the fire area*	Y/N	*i.e. 4.2.4*	XE-X or N/A	XE-X or N/A
			Total	XE-X	XE-X

Note: Not Applicable (N/A) applies to those fire areas that are deterministically compliant in accordance with NFPA 805, Section 4.2.3.

Attachment D of this safety evaluation is broken down into those fire areas that were analyzed using the deterministic approach in accordance with NFPA 805, Section 4.2.3, and those using the performance-based approach in accordance with NFPA 805, Section 4.2.4. Each fire area includes a discussion of how the licensee met the requirement to evaluate the fire suppression effects on the ability to meet the nuclear safety performance criteria.

SE Attachment D also addresses those NRC approved exemptions *[or: deviations]* from the existing deterministic licensing basis that the licensee desires to incorporate into the RI/PB FPP, as allowed by NFPA 805, Section 2.2.7. The attachment includes a description of the previously approved exemption *[or: deviation]* from the deterministic requirements, the basis for and continuing validity of the exemption *[or: deviation]*, and the NRC staff's evaluation of that exemption *[or: deviation]*. The licensee stated in LAR Section 4.2.2, "Existing Engineering

Equivalency Evaluation Transition," that the review of these existing licensing actions included a determination of the basis of acceptability and a determination that the basis of acceptability was still valid.

A primary purpose of NFPA 805 Chapter 4 is to determine, by analysis, what fire protection features and systems need to be credited to meet the NSPC. Four sections of NFPA 805 Chapter 3 have requirements dependent upon the results of the engineering analyses performed in accordance with NFPA 805 Chapter 4: (1) fire detection systems, in accordance with Section 3.8.2, (2) automatic water-based fire suppression systems, in accordance with Section 3.9.1, (3) gaseous fire suppression systems, in accordance with Section 3.10.1, and (4) passive fire protection features, in accordance with Section 3.11. The features/systems addressed in these sections are only required when the analyses performed in accordance with NFPA 805 Chapter 4 indicate the features and systems are required to meet the NSPC.

[if needed:] With the exception of Electrical Raceway Fire Barrier Systems (ERFBS), passive fire protection features address the fire barriers used to form fire area boundaries (and barriers separating safe shutdown trains) that were previously reviewed and approved in accordance with PLANT's existing deterministic FPP. For its transition to NFPA 805, the licensee decided to retain the previously approved fire area boundaries as part of the RI/PB FPP.

The fire barrier fire resistance rating necessary for separation between fire areas under NFPA 805 (i.e. 3 hours) is the same as that necessary under plant's existing licensing basis, which for PLANT is *[insert licensing basis]*. *[Describe the fire areas used by the licensee.]* *[Provide an evaluation of the fire areas in the LAR.]*

The ERFBS used at PLANT were analyzed using the performance-based approach in accordance with NFPA 805 Section 4.2.4 [*and/or* met the deterministic requirements of NFPA 805 Chapter 3]. In SE Attachment D, each fire area utilizing ERFBS includes a discussion of the Variance from Deterministic Requirements (VFDR) analysis used to evaluate the acceptability of this feature [*and/or* indicates that the fire area is in deterministic compliance] .

[if needed:] In addition to the above, SE Attachment D provides an evaluation of the defense-in-depth recovery actions for each applicable fire area. As discussed in SE Section 3.2.4, the licensee created a class of recovery actions that are not needed to maintain the availability of a success path and do not adversely impact risk, but which are being credited to enhance defense-in-depth for the fire area. Because the licensee has identified these recovery actions as being necessary to provide adequate defense-in-depth, the NRC staff has evaluated them as a part of the RI/PB FPP. As such, future removal of these defense-in-depth recovery actions would require a plant change evaluation in accordance with NFPA 805, Section 2.4.4.

Finally, as part of the NSCA, the licensee evaluated fire detection and suppression systems on a fire zone basis [*or* fire area basis]. In SE Attachment D, the evaluation of each fire area includes a table that documents the licensee's review of these fire detection and suppression systems, as well as the NRC staff's evaluation of the review and its results.

As documented in SE Attachment D, for those fire areas that utilized a deterministic approach in accordance with NFPA 805, Section 4.2.3, the NRC staff finds that each of the fire areas analyzed using the deterministic approach meet the associated criteria of NFPA 805, Section 4.2.3.2. This conclusion is based on (1) the licensee's documented compliance with NFPA 805, Section 4.2.3.2; (2) the licensee's assertion that the success path will be free of fire

damage without reliance on recovery actions; (3) an assessment that the suppression systems in the fire area will have no impact on the ability to meet the nuclear safety performance criteria ; and (4) the licensee's appropriate determination of the automatic fire suppression and detection systems required to meet the nuclear safety performance criteria.

In addition, for those fire areas that utilized the performance-based approach in accordance with NFPA 805, Section 4.2.4, the NRC staff finds that each fire area has been properly analyzed, and compliance with the NFPA 805 requirements demonstrated as follows:

- Deviations from the existing fire protection licensing basis were reviewed for applicability, as well as continued validity, and found acceptable.

- VFDRs were either evaluated and found to be acceptable based on an integrated assessment of risk, defense-in-depth, and safety margins, or modifications were planned/implemented to address the issue.

- Recovery actions used to demonstrate the availability of a success path to achieve the nuclear safety performance criteria were evaluated and the additional risk of their use determined, reported, and found to be acceptable.

- The licensee's analysis appropriately identified the fire protection SSCs required to meet the nuclear safety performance criteria, including:

  — Fire suppression and detection systems.

  — Fire area boundaries (ceilings, walls, and floors), such as fire barriers, fire barrier penetrations, and through penetration fire stops.

- *[if needed]*ERFBS credited were documented on a fire area basis, verified to be installed consistent with tested configurations and rated accordingly, and evaluated using a fire risk evaluation that demonstrated the ability to meet the applicable acceptance criteria for risk, defense-in-depth, and safety margins.

Accordingly, each fire area utilizing the performance-based approach was able to achieve and maintain the nuclear safety performance criteria, and the associated fire risk evaluations meet the applicable NFPA 805 requirements for risk, defense-in-depth, and safety margins.

3.5.2. Fire Protection During Non-Power Operational Modes

NFPA 805, Section 1.1 "Scope," states the following:

> This standard specifies the minimum fire protection requirements for existing light water nuclear power plants during all phases of plant operation, including shutdown, degraded conditions, and decommissioning.

NFPA 805, Section 1.3.1, "Nuclear Safety Goal," states the following:

> The nuclear safety goal is to provide reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition.

The NRC staff reviewed LAR Section 4.3, "Non-Power Operational Modes" and Attachment D, "NEI 04-02 Table F-1 Non-Power Operational Modes Transition," to evaluate the licensee's treatment of potential fire impacts during non-power operations (NPOs). PLANT used the process provided in NEI 04-02, Revision 2, (Reference X) for demonstrating that the nuclear safety performance criteria are met for higher risk evolutions (HREs) during NPO modes.

The NRC staff endorsed FAQ 07-0040," Non-Power Operations Clarification," Revision 4, to clarify the guidance from NEI 04-02 with regard to providing "reasonable assurance that a fire during non-power operations will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition." Specifically, FAQ 07-0040 clarifies the following:

- The process for selecting equipment and cabling to evaluate for NPO modes.
- Evaluation of HREs during NPO modes.
- The process for analyzing key safety functions (KSFs) in different plant operational states (POSs).
- The actions taken beyond the normal fire protection program defense-in-depth actions when a specific KSF could be lost as a direct result of fire damage

In LAR Section 4.3, the licensee states that the process used to demonstrate that the nuclear safety performance criteria are met during NPO modes is consistent with FAQ 07-0040, Revision 4. The licensee's strategy for control and protection of equipment during NPO modes includes *[describe the important aspects of the strategy]*.

The licensee states that its goal is to ensure that contingency plans are established when the plant is in an HRE and it is possible to lose a KSF due to fire. *Describe the controls and measures that are evaluated during NPOs*. LAR Section 4.3 discusses these additional controls and measures. However, during low risk periods normal risk management controls, as well as fire prevention and protection processes and procedures will be utilized at PLANT.

[Discuss the process used to review the outage management to define HRE and any impact outage activities may have on KSFs. Describe the process used to identify systems and equipment to include in the NPR review]

The licensee stated in the LAR that the *[insert site-specific document]* defines the KSFs, the success paths to achieve the KSFs, and the components required for the success paths.

Based on its review of the information provided in the LAR, the NRC staff concludes that the licensee used methods consistent with the interim guidance provided in FAQ 07-0040, Revision 4 and RG 1.205, Revision 1 (Reference X), to identify the equipment required to achieve and maintain the fuel in a safe and stable condition during NPO modes. Furthermore, the licensee has a process in place to ensure that fire protection DID measures will be implemented to achieve the KSFs during plant outages.

The licensee identified approximately [insert number] power operated components needed to support an NPO KSF that were not included in the post-fire safe shutdown equipment list and

required additional circuit analysis. *[Describe how these additional components were evaluated].*

[Discuss how the NSPC are met in NPO conditions (i.e. through the use of defense in depth actions). Describe the licensee's review of the NPO risk. Provide an evaluation of the NPO risk]

NFPA 805 requires that the nuclear safety performance criteria be met during any operational mode or condition, including NPO. As described above, the licensee has performed the following engineering analyses to demonstrate that it meets this requirement:

- Identified the KSFs required to support the nuclear safety performance criteria during non-power operations.
- Identified the POSs where further analysis is necessary during non-power operations.
- Identified the SSCs required to meet the KSFs during the POSs analyzed.
- Identified the location of these SSCs and their associated cables.
- Performed analyses on a fire area *[or fire zone]* basis to identify pinch points were one or more KSF could be lost as a direct result of fire-induced damage.
- Planned/implemented modifications to appropriate station procedures in order to employ one or more fire protection strategy for reducing risk at these pinch points during HREs.

[If needed summarize the credit taken for defense-in-depth actions on KSFs required during NPOs.] Accordingly, based on the information provided in the LAR as supplemented, the NRC staff concludes that the licensee has provided reasonable assurance that the nuclear safety performance criteria are met during NPO modes and HREs at PLANT.

3.5.3. Conclusion for Section 3.5

The NRC staff reviewed the licensee's RI/PB FPP, as described in the LAR and its supplements, to evaluate the nuclear safety capability assessment results. The licensee used a combination of the deterministic approach in accordance with NFPA 805, Section 4.2.3, and the performance-based approach in accordance with NFPA 805, Section 4.2.4 to perform this assessment at PLANT.

For those fire areas that utilized a deterministic approach, the NRC staff verified the following:

- Exemptions [*OR* Deviations] from the existing PLANT FPP were evaluated and found to be valid and acceptable for meeting the deterministic requirements of NFPA 805, as allowed by NFPA 805, Section 2.2.7.
- Fire suppression effects were evaluated and found to have no adverse impact on the ability to achieve and maintain the nuclear safety performance criteria for each fire area.
- All defense-in-depth recovery actions were documented for each fire area.

- The required automatic fire suppression and automatic fire detection systems were appropriately documented for each fire area.

Accordingly, the staff finds that each fire area *[or fire zone]* utilizing the deterministic approach meets the deterministic requirements of NFPA 805, Section 4.2.3.

For those fire areas *[or fire zones]* that utilized a performance-based approach, the staff verified the following:

- Exemptions *[or Deviations]* from the existing PLANT FPP were evaluated and found to be valid and acceptable for meeting the deterministic requirements of NFPA 805 as allowed by NFPA 805, Section 2.2.7.

- Fire suppression effects were evaluated and found to have no adverse impact on the ability to achieve and maintain the nuclear safety performance criteria for each fire area.

- All VFDRs were evaluated using the fire risk evaluation performance-based method (in accordance with NFPA 805, Section 4.2.4.2) to address risk impact, DID, and SM, and found to be acceptable.

- All recovery actions necessary to demonstrate the availability of a success path were evaluated with respect to the additional risk presented by their use and found to be acceptable in accordance with NFPA 805, Section 4.2.4.

- All defense-in-depth recovery actions were properly documented for each fire area.

- The required automatic fire suppression and automatic fire detection systems were appropriately documented for each fire area.

Accordingly, the staff finds that each fire area utilizing the performance-based approach, in accordance with NFPA 805, Section 4.2.4, is able to achieve and maintain the nuclear safety performance criteria. Furthermore, the associated fire risk evaluations meet the requirements for risk, DID and SM.

The NRC staff's review of the licensee's analysis and outage management process during non-power operational modes found that the licensee provided reasonable assurance that the nuclear safety performance criteria will be met during NPO modes and HREs. *[if applicable]* The staff review also found that the normal fire protection program defense-in-depth actions are credited for addressing the risk impact of those fires which potentially affect one or more trains of equipment that provide a KSF required during NPO modes, but would not be expected to cause the total loss of that KSF. The NRC staff finds this overall approach for fire protection during NPO modes acceptable.

3.6. Radioactive Release Performance Criteria

NFPA 805 Chapter 1 defines the radioactive release goals, objectives, and performance criteria that must be met by the fire protection program in the event of a fire at a nuclear power plant.

Radioactive Release Goal.

The radioactive release goal is to provide reasonable assurance that a fire will not result in a radiological release that adversely affects the public, plant personnel, or the environment.

Radioactive Release Objective.

Either of the following objectives shall be met during all operational modes and plant configurations.

(1) Containment integrity is capable of being maintained.

(2) The source term is capable of being limited.

Radioactive Release Performance Criteria.

Radiation release to any unrestricted area due to the direct effects of fire suppression activities (but not involving fuel damage) shall be as low as reasonably achievable and shall not exceed applicable 10 CFR Part 20 limits.

[Describe the process used by the licensee to develop engineering controls to prevent the release of radiological material in the event of a fire. Also discuss fire brigade training materials that were updated to meet the requirements of NFPA 805].

[Discuss how the licensee addressed the nuclear safety and radiological release goals during non-power modes of operation.]

The licensee's position, as outlined above, is consistent with NFPA 805, Subsection 1.4.2(2), which states that "the source term is capable of being limited." Specifically, when the reactor is defueled, the radioactive source term is significantly reduced, resulting in a much lower potential for radioactive release. Accordingly, the NRC staff finds this approach acceptable.

The licensee also stated that (1) the established PLANT *[insert site specific program title]* will maintain the results of the radioactive release reviews after completion of the transition to NFPA 805 and (2) the *[insert site specific calculation category]* for the applicable fire areas incorporate the results of the radioactive release reviews. (Note: Section 3.8 of this SE contains the NRC staff's review of the licensee's configuration management processes.)

Based on (1) the information provided in the LAR, as supplemented, (2) the licensee's use of fire pre-plans, (3) the results of the NRC staff's evaluation of the identified engineered controls used to manage suppression water and combustion products, and (4) the development and implementation of newly revised fire brigade training procedures, the NRC staff concludes that the licensee's RI/PB FPP provides reasonable assurance that radiation releases to any unrestricted area resulting from the direct effects of fire suppression activities at PLANT are as low as reasonably achievable and are not expected to exceed the radiological dose limits in 10 CFR Part 20. In conclusion, the NRC staff finds that the licensee's RI/PB FPP complies with the requirements specified in NFPA 805, Sections 1.3.2, 1.4.2, and 1.5.2.

3.7. NFPA 805 Monitoring Program

For this section of the SE, the following requirements from NFPA 805, Section 2.6, are applicable to the NRC staff's review of the licensee's amendment request:

Monitoring: A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid.

Availability, Reliability, and Performance Levels: Acceptable levels of availability, reliability, and performance shall be established.

Monitoring Availability, Reliability, and Performance: Methods to monitor availability, reliability, and performance shall be established. The methods shall consider the plant operating experience and industry operating experience.

Corrective Action: If the established levels of availability, reliability, or performance are not met, appropriate corrective actions to return to the established levels shall be implemented. Monitoring shall be continued to ensure that the corrective actions are effective.

The NRC staff reviewed the monitoring program described in LAR Section 4.6, "Monitoring Program" that the licensee developed to monitor availability, reliability, and performance of PLANT fire protection program systems and features after the transition to NFPA 805. The focus of the NRC staff's evaluation involved identifying the critical elements related to the monitoring program, including the selection of FPP systems and features to be included in the program, the attributes of those systems and features that will be monitored, and the methods for monitoring those attributes. Implementation of the monitoring program will occur on the same schedule as the NFPA 805 RI/PB FPP implementation, which the NRC staff found acceptable.

[Describe the process used by the licensee to identify FPP elements that will be monitored in accordance with NFPA 805. Include a discussion of the scope of the monitoring program as well as any process used to identify and evaluate the most risk significant fire compartments.]

As described above, NFPA 805, Section 2.6, requires that a monitoring program be established in order to ensure that the availability and reliability of fire protection systems and features are maintained, as well as to assess the overall effectiveness of the fire protection program in meeting the performance criteria. Monitoring should ensure that the assumptions in the associated engineering analysis remain valid. Based on the information provided in the LAR, as supplemented, the NRC staff finds that the licensee's *[insert brief process description]* provides reasonable assurance that PLANT will implement an effective program for monitoring risk significant fire SSCs because the *[insert brief process description]* ensures that the NFPA 805 monitoring program does the following:

- Establishes the appropriate performance monitoring groups to be monitored.
- Utilizes an acceptable screening process for determining the structures, systems, and components to be included in the PMGs.
- Establishes availability, reliability and performance criteria for the SSCs being monitored.

- Requires corrective actions when SSC availability, reliability, and performance criteria targets are exceeded in order bring performance back within the required range.

*[if needed]*However, since the final values for availability and reliability, as well as the performance criteria for the SSCs being monitored, have not been established for the monitoring program as of the date of this SE, completion of the PLANT NFPA 805 Monitoring Program is an implementation item, as noted previously. Completion of the monitoring program will occur on the same schedule as the implementation of NFPA 805, which the NRC staff finds acceptable. Accordingly, the NRC staff concludes that, upon successful closure of the implementation item in this area, there is reasonable assurance that the licensee will meet the requirements specified in NFPA 805, Sections 2.6.1, 2.6.2, and 2.6.3 regarding a monitoring program.

3.8. Program Documentation, Configuration Control, and Quality Assurance

For this section of the SE, the requirements from NFPA 805, Section 2.7, "Program Documentation, Configuration Control and Quality," are applicable to the NRC staff's review of the licensee's amendment request in regard to the appropriate content, configuration control, and quality of the documentation used to support the transition to NFPA 805 at PLANT.

3.8.1. Documentation

The staff reviewed LAR Section 4.7.1, "Compliance with Documentation Requirements in Section 2.7.1 of NFPA 805," to evaluate the appropriateness of the content of the PLANT fire protection program design basis document and supporting documentation.

PLANT's fire protection program design basis is a compilation of multiple documents (i.e., fire safety analyses, calculations, engineering evaluations, NSCAs, etc.), databases, and drawings which are identified in LAR Figure 4-8, "NFPA 805 Transition – Planned Post-Transition Documentation Relationships." The licensee stated that the analyses conducted to support the NFPA 805 transition were performed in accordance with *[describe the calculation procedure]* which meets or exceeds the requirements for documentation outlined in NFPA 805, Section 2.7.1.

Specifically, this design analysis and calculation procedure provides the methods and requirements to ensure that design inputs and assumptions are clearly defined, results are easily understood by being clearly and consistently described, and that sufficient detail is provided to allow future review of the entire analysis. The process includes provisions for appropriate design and engineering review and approval. In addition, the approved analyses are considered controlled documents, and are accessible via PLANT's document control system. Being analyses, they are also subject to review and revision consistent with the other plant calculations and analyses, as required by the plant design change process.

[describe the content of the LAR related to the types of documentation that fall under NPFA 805 2.7.1 requirements]

The licensee also stated in the LAR that the documentation associated with the PLANT RI/PB FPP will be maintained for the life of the plant and organized in such a way to facilitate review for accuracy and adequacy by independent reviewers, including the NRC staff.

Based on the description provided in the LAR, as supplemented, of the content of the PLANT NFPA 805 fire protection program design basis and supporting documentation, and taking into account the licensee's plans to maintain this documentation throughout the life of the plant, the NRC staff finds that the licensee's approach meets the requirements of NFPA 805, Sections 2.7.1.1, 2.7.1.2, and 2.7.1.3, regarding adequate development and maintenance of the fire protection program design basis documentation.

3.8.2. Configuration Control

The staff reviewed LAR Section 4.7.2, "Compliance with Configuration Control Requirements in Section 2.7.2 of NFPA 805," in order to evaluate the configuration control process at PLANT.

[Describe the configuration control processes and procedures. The following is sample language:]
To support the many other technical, engineering and licensing programs at PLANT, the licensee has existing configuration control processes and procedures for establishing, revising, or utilizing program documentation. Accordingly, the licensee is integrating the RI/PB FPP design basis and supporting documentation into these existing configuration control processes and procedures. These processes and procedures require that all plant changes be reviewed for potential impact on the various PLANT licensing programs, including the fire protection program.

The licensee stated in the LAR that the configuration control process includes provisions for appropriate design and engineering reviews and approvals, and that approved analyses are considered controlled documents available through the PLANT document control system. The licensee also stated that analyses based on the PRA program, which includes the Fire PRA, are issued as formal analyses subject to these same configuration control processes, and are additionally subjected to the PRA peer review process specified in the ASME/ANS PRA standard (Reference X).

Configuration control of the FPP during the transition period is maintained by the PLANT change evaluation process, as defined in *[insert document type]*. *[describe how the process will be controlled after full implementation]*

Note that the NRC staff reviewed the licensee's process for updating and maintaining the PLANT Fire PRA in order to reflect plant changes made after completion of the transition to NFPA 805 in Section 3.4.1 of this SE.

Based on the description of the PLANT configuration control process, which indicates that the PLANT RI/PB FPP design basis and supporting documentation are controlled documents and that plant changes are reviewed for impact on the FPP, the NRC staff finds that the licensee has a configuration control process which meets the requirements of NFPA 805, Sections 2.7.2.1 and 2.7.2.2, for revising FPP design basis documents, supporting documents, and applicable FPP documentation to reflect changes made to the RI/PB FPP after the NFPA 805 FPP has been implemented.

3.8.3. Quality

The staff reviewed LAR Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA 805," to evaluate the quality of the engineering analyses used to support transition to NFPA 805 at PLANT based on the requirements outlined above.

Review

NFPA 805 requires that each analysis, calculation, or evaluation performed be independently reviewed. The licensee stated that their procedures require independent review of analyses, calculations, and evaluations, including those performed in support of compliance with 10 CFR 50.48(c). The LAR also states that the analyses, calculations, and evaluations performed in support of the transition to NFPA 805 were independently reviewed, and that analyses, calculations, and evaluations to be performed post-transition will be independently reviewed as required by the existing LICENSEE procedures.

Based on the licensee's description of the PLANT process for performing independent reviews of analyses, calculations, and evaluations, the NRC staff finds the licensee's approach for meeting the requirements of NFPA 805, Section 2.7.3.1, acceptable.

Verification and Validation

NFPA 805 requires that each calculational model or numerical method used be verified and validated through comparison to test results or other acceptable models. The licensee stated that the calculational models and numerical methods used in support of the transition to NFPA 805 were verified and validated, and that the calculational models and numerical methods used post-transition will be similarly verified and validated. *[adjust example for the site-specific LAR]* As an example, the licensee provided extensive information related to the verification and validation of fire models used to support the development of the PLANT Fire PRA, which the NRC staff found acceptable (fire modeling in support of the PLANT Fire PRA is addressed in SE Section 3.4.1).

The licensee also stated that it will revise the appropriate processes and procedures to include NFPA 805 quality requirements for use during the performance of post-transition FPP changes, including those for verification and validation. Revision of the applicable post-transition processes and procedures to include NFPA 805 requirements for verification and validation is an implementation item (SE Section 2.8; Item #X).

Based on the licensee's description of the PLANT process for verification and validation of calculational models and numerical methods, the NRC staff finds the licensee's approach to meeting the requirements of NFPA 805 Section 2.7.3.2 acceptable.

Limitations of Use

NFPA 805 requires that acceptable engineering methods and numerical models only be used for applications to the extent that these methods have been subject to verification and validation; and that they only be applied within the scope, limitations, and assumptions prescribed for that method. The licensee stated that the engineering methods and numerical models used in support of the transition to NFPA 805 were used subject to the limitations of use outlined in NFPA 805, Section 2.7.3.3, and that the engineering methods and numerical models used post-transition will be subject to these same limitations of use. *[adjust example for the site-specific LAR]* As an example, in LAR Section 4.5.2, "Fire Modeling," the licensee stated that

the fire models developed to support the NFPA 805 transition at PLANT fall within their verification and validation limitations.

The licensee also stated that it will revise the appropriate processes and procedures to include the NFPA 805 quality requirements for use during the performance of post-transition FPP changes, including those for limitations of use. Revision of the applicable post-transition processes and procedures to include NFPA 805 requirements for limitations of use is an implementation item (SE Section 2.8; Item I#X)

Based on the licensee's statements that the fire models used to support development of the Fire PRA were used within their limitations, and the description of the PLANT process for placing limitations on the use of engineering methods and numerical models, the NRC staff finds the licensee's approach to meeting the requirements of NFPA 805 Section 2.7.3.3 acceptable.

Qualification of Users

NFPA 805 requires that personnel performing engineering analyses and applying numerical methods (e.g. fire modeling) shall be competent in that field and experienced in the application of these methods as they relate to nuclear power plants, nuclear power plant fire protection, and power plant operations. The licensee's procedures require that cognizant personnel who use and apply engineering analyses and numerical models be competent in the field of application and experienced in the application of the methods, including those personnel performing analyses in support of compliance with 10 CFR 50.48(c).

Specifically, these requirements are being addressed through the implementation of an engineering qualification process at PLANT. The licensee has developed *[describe the qualification program and associated training for personnel performing engineering analyses and numerical methods]*.

The NRC staff concludes that appropriately competent and experienced personnel developed the PLANT fire PRA, including the supporting fire modeling calculations and including the additional documentation for models and empirical correlations not identified in previous NRC approved V&V documents. In addition, based on the licensee's description of the PLANT procedures for ensuring personnel who use and apply engineering analyses and numerical methods are competent and experienced, the NRC staff finds the licensee's approach for meeting the requirements of NFPA 805, Section 2.7.3.4, acceptable.

Uncertainty Analysis

NFPA 805 requires that an uncertainty analysis be performed to provide reasonable assurance that the performance criteria have been met. (Note: 10 CFR 50.48(c)(2)(iv) states that an uncertainty analysis performed in accordance with NFPA 805, Section 2.7.3.5, is not required to support calculations used in conjunction with a deterministic approach.) The licensee stated that an uncertainty analysis was performed for the analyses used in support of the transition to NFPA 805, and that an uncertainty analysis will be performed for post-transition analyses.

The industry consensus standard for PRA development (i.e., the ASME/ANS PRA standard) includes requirements to address uncertainty. Accordingly, the licensee addressed uncertainty as a part of the development of the PLANT Fire PRA. Table Y-7, "Sources of Uncertainty," in LAR Attachment Y, "Fire PRA Insights," provides a detailed listing of the sources of uncertainty

in the Fire PRA and the licensee's evaluation of each. The NRC staff's evaluation of the licensee's treatment of these uncertainties is discussed in SE Section 3.4.7.

The licensee also stated that it will revise the appropriate processes and procedures to include the NFPA 805 quality requirements for use during the performance of post-transition FPP changes, including those regarding uncertainty analysis. Revision of the applicable post-transition processes and procedures to include NFPA 805 requirements regarding uncertainty analysis is an implementation item (SE Section 2.8; Item #X).

Based on the licensee's description of the PLANT process for performing an uncertainty analysis, the NRC staff finds the licensee's approach for meeting the requirements of NFPA 805 Section 2.7.3.5 acceptable.

Based on the above discussions, the NRC staff finds that the PLANT RI/PB FPP quality assurance process adequately addresses each of the requirements of NFPA 805, Section 2.7.3, which include conducting independent reviews, performing V&V, limiting the application of acceptable methods and models to within prescribed boundaries, ensuring that personnel applying acceptable methods and models are qualified, and performing uncertainty analyses. The individual section of this SE provide the NRC staff's evaluation of the application of the NFPA 805 quality requirements to the licensee's FPP, as appropriate.

3.8.4. Fire Protection Quality Assurance Program

GDC 1 of Appendix A to 10 CFR Part 50 requires the following:

> Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

The licensee established its Fire Protection Quality Assurance Program in accordance with the guidelines of NUREG-0800, Section 9.5-1, BTP CMEBC.4, "Quality Assurance Program ," (Reference 10). In addition, the guidance in Appendix C to NEI 04-02 (Reference 19) suggests that the LAR include a description of how the existing fire protection quality assurance (QA) program will be transitioned to the new NFPA 805 RI/PB FPP, as discussed below.

[Describe the NFPA 805 QA program as stated in the LAR. Include a discussion of any additional power block areas that will be included in the QA program to meet the requirements of NFPA 805 Chapter 4].

The NRC staff finds that the licensee's changes to the fire protection QA program are acceptable because they include the expansion of the existing program to include those fire protection systems that were previously not included within the scope of the fire protection QA program that are required by NFPA 805 Chapter 4.

3.8.5. Conclusion for Section 3.8

The NRC staff reviewed the licensee's RI/PB FPP, as described in the LAR, as supplemented, to evaluate the NFPA 805 program documentation content, the associated configuration control process, and the appropriate quality assurance requirements. The NRC staff concludes that, the licensee's approach meets the requirements specified in NFPA 805, Section 2.7, regarding program documentation, configuration control, and quality.

4.0 LICENSE CONDITION

The licensee proposed a fire protection program license condition regarding transition to a RI/PB FPP under NFPA 805, in accordance with 10 CFR 50.48(c)(3)(i). The new license condition adopts the guidelines of the standard fire protection license condition promulgated in Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, Regulatory Position C.3.1, as issued on December 18, 2009 (74 FR 67253). Plant-specific changes were made to the sample license condition; however, the proposed plant-specific fire protection program license condition is consistent with the standard fire protection license condition, incorporates all of the relevant features of the transition to NFPA 805 at PLANT, and is therefore acceptable.

The following license condition is included in the revised license for the FULL PLANT NAME, Unit X, and will replace [*Renewed]* Operating License No. NFP-XX Condition X.X:

> Fire Protection Program
>
> FULL LICENSEE NAME shall implement and maintain in effect all provisions of the approved fire protection program that comply with 10 CFR 50.48(a) and 10 CFR 50.48(c), as specified in the license amendment request dated MONTH DAY, YEAR, supplemented by letter dated MONTH DAY, YEAR, and approved in the associated safety evaluation dated MONTH DAY, YEAR. Except where NRC approval for changes or deviations is required by 10 CFR 50.48(c) and NFPA 805, and provided no other regulation, technical specification, license condition or requirement would require prior NRC approval, the licensee may make changes to the fire protection program without prior approval of the Commission if those changes satisfy the provisions set forth in 10 CFR 50.48(a) and 10 CFR 50.48(c), the change does not require a change to a technical specification or a license condition, and the criteria listed below are satisfied.
>
> Risk-Informed Changes that May Be Made Without Prior NRC Approval
>
> A risk assessment of the change must demonstrate that the acceptance criteria below are met. The risk assessment approach, methods, and data shall be acceptable to the NRC and shall be appropriate for the nature and scope of the change being evaluated; be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at the plant. Acceptable methods to assess the risk of the proposed change may include methods that have been used in the peer-reviewed Fire PRA model, methods that have been approved by the NRC via a plant-specific license amendment or through NRC approval of generic methods specifically for use in NFPA 805 risk assessments, or methods that have been demonstrated to bound the risk impact.
>
> (a) Prior NRC review and approval is not required for changes that clearly result in a decrease in risk. The proposed change must also be consistent with the defense in depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

(b) Prior NRC review and approval is not required for individual changes that result in a risk increase less than $1x10^{-7}$/yr for CDF and less than $1x10^{-8}$/yr for LERF. The proposed change must also be consistent with the defense-in-depth philosophy and must maintain sufficient safety margins. The change may be implemented following completion of the plant change evaluation.

Other Criteria for Changes that May Be Made to the NFPA 805 Fire Protection Program Without Prior NRC Approval

{Include a plant-specific list of any non risk-informed changes to the FPP.}

(1) Changes to NFPA 805, Chapter 3, Fundamental Fire Protection Program Elements and Design Requirements

Prior NRC review and approval are not required for changes to the NFPA 805 Chapter 3 fundamental fire protection program elements and design requirements for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is functionally equivalent or adequate for the hazard.

The licensee may use an engineering evaluation to demonstrate that a change to an NFPA 805 Chapter 3 element is functionally equivalent to the corresponding technical requirement. A qualified fire protection engineer shall perform the engineering evaluation and conclude that the change has not affected the functionality of the component, system, procedure, or physical arrangement, using a relevant technical requirement or standard.

The licensee may use an engineering evaluation to demonstrate that changes to certain NFPA 805 Chapter 3 elements are acceptable because the alternative is "adequate for the hazard." Prior NRC review and approval would not be required for alternatives to four specific sections of NFPA 805 Chapter 3, for which an engineering evaluation demonstrates that the alternative to the Chapter 3 element is adequate for the hazard. *[include the key attributes of the engineering evaluation]*.

The four specific sections of NFPA 805 Chapter 3 are as follows:

- 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).

This License Condition does not apply to any demonstration of equivalency under Section 1.7 of NFPA 805.

(2) Fire Protection Program Changes that Have No More than Minimal Risk Impact

Prior NRC review and approval is not required for changes to the licensee's fire protection program that have been demonstrated to have no more than a minimal risk impact. The licensee may use its screening process, as approved in the NRC safety evaluation dated MONTH DAY, YEAR, to determine that certain fire protection program changes meet the minimal risk criterion. The licensee shall in all cases ensure that fire protection defense-in-depth and safety margins are maintained when changes are made to the fire protection program.

(3) *[if needed]* Unless License Condition (2) is met, risk-informed changes to the licensee's fire protection program which involve fire areas that credit *[insert plant-specific technology or treatment]* may not be made without prior NRC review and approval until the PLANT NAME Fire PRA model has been modified to incorporate an NRC-accepted method for modeling *[insert plant-specific technology or treatment]*.

Transition License Conditions

(1) Before achieving full compliance with 10 CFR 50.48(c), as specified by Transition License Condition (2), risk-informed changes to the licensee's fire protection program may not be made without prior NRC review and approval unless the change has been demonstrated to have no more than a minimal risk impact, as described in License Condition (2) above.

(2) The licensee shall implement the following modifications to its facility in order to complete the transition to full compliance with 10 CFR 50.48(c) by MONTH DAY, YEAR, (note that each modification is listed by *[insert title of classification scheme],* as described in Attachment R of the PLANT NAME LAR, and outlined in Table 2.8.1-2 of the associated NRC safety evaluation):

[insert a plant-specific list of any modifications identified by the licensee as necessary to complete transition to its new fire protection license basis.]

- XXXXXX
- XXXXXX
- XXXXXX
- XXXXXX

(3) The licensee shall maintain appropriate compensatory measures in place until completion of the modifications delineated above.

5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION

The Commission's regulations in 10 CFR 50.92(c) state that the Commission may make a final determination that a proposed license amendment involves no significant hazards consideration if operation of the facility in accordance with the amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

As required by 10 CFR 50.91(a), in its MONTH DAY, YEAR, application to transition the fire protection program at the PLANT NAME, Unit X, to one based on NFPA 805, in accordance with 10 CFR 50.48(c), the licensee provided its analysis of the issue of no significant hazards consideration. In its MONTH DAY, YEAR, submittal, the licensee stated that *[adjust quotation as appropriate]* "to the extent that these conclusions apply to compliance with the requirements in NFPA 805, they are based on statements in the Statements of Consideration accompanying the adoption of alternative fire protection requirements based on NFPA 805."

The following evaluation in relation to the standards of 10 CFR 50.92(c) explains the NRC staff's final no significant hazards consideration determination.

Criterion 1: The Proposed Change Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated

Operation of PLANT in accordance with the proposed amendment does not increase the probability or consequences of accidents previously evaluated. The proposed amendment does not adversely affect accident initiators or precursors, nor does it alter design assumptions, conditions, or configurations of the facility, and it does not adversely impact the ability of structures, systems, or components (SSCs) to perform their intended function to mitigate the consequences of an initiating event within the assumed acceptance limits. The proposed changes do not physically alter safety-related systems nor affect the way in which safety-related systems perform their functions. The SSCs required to safely shut down the reactor and to maintain it in a safe shutdown condition will remain capable of performing their design functions.

The purpose of this amendment is to permit PLANT to adopt a new risk-informed, performance-based fire protection licensing basis that complies with the requirements in 10 CFR 50.48(a) and 10 CFR 50.48(c), as well as the guidance contained in Regulatory Guide 1.205. The NRC considers that NFPA 805 provides an acceptable methodology and performance criteria for licensees to identify fire protection requirements that are an acceptable alternative to the 10 CFR Part 50, Appendix R, fire protection features (69 FR 33536; June 16, 2004).

The purpose of the fire protection program is to provide assurance, through defense-in-depth, that the NRC's fire protection objectives are satisfied. These objectives are: (1) preventing fires from starting; (2) rapidly detecting and controlling fires and promptly extinguishing those fires that do occur, thereby limiting fire damage; (3) providing an adequate level of fire protection for SSCs important to safety, so that a fire that is not promptly extinguished will not prevent essential plant safety functions from being performed; and (4) ensuring that fires will not significantly increase the risk of radioactive releases to the environment. In addition, fire protection systems must be designed such that their failure or inadvertent operation does not adversely impact the ability of the SSCs important to safety to perform their safety-related functions.

NFPA 805, taken as a whole, provides an acceptable alternative for satisfying General Design Criterion 3 (GDC 3) of Appendix A to 10 CFR Part 50, meets the underlying intent of the NRC's existing fire protection regulations and guidance, and achieves defense-in-depth along with the goals, performance objectives, and performance criteria specified in NFPA 805, Chapter 1. In

addition, if there are any increases in core damage frequency (CDF) or risk as a result of the transition to NFPA 805, the increase will be small, governed by the delta risk requirements of NFPA 805, and consistent with the intent of the Commission's Safety Goal Policy.

Engineering analyses, which may include engineering evaluations, probabilistic risk assessments, and fire modeling calculations, have been performed to demonstrate that the performance-based requirements of NFPA 805 have been met. The Final Safety Analysis Report (FSAR) documents the analyses of design basis accidents (DBAs) at PLANT. All accident analysis acceptance criteria will continue to be met with the proposed amendment. The proposed changes will not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of any accident previously evaluated. The proposed changes will not alter any assumptions or change any mitigation actions for the radiological consequence evaluations in the FSAR. In addition, the applicable radiological dose acceptance criteria will continue to be met.

Based on the above, the implementation of this amendment to transition the FPP at PLANT to one based on NFPA 805, in accordance with 10 CFR 50.48(c), does not increase the probability of any accident previously evaluated. In addition, all equipment required to mitigate an accident remains capable of performing the assumed function. Therefore, the consequences of any accident previously evaluated are not increased with the implementation of this amendment.

Criterion 2: The Proposed Change Does Not Create the Possibility of a New or Different Kind of Accident from Any Accident Previously Evaluated

Operation of PLANT in accordance with the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. Any scenario or previously analyzed accident with offsite dose consequences was included in the licensee's evaluation of DBAs documented in the FSAR as a part of the transition to NFPA 805. The proposed amendment does not impact these accident analyses. The proposed change does not alter the requirements or functions for systems required during accident conditions, nor does it alter the required mitigation capability of the fire protection program, or its functioning during accident conditions as assumed in the licensing basis analyses and/or DBA radiological consequences evaluations.

Implementation of the new risk-informed, performance-based fire protection licensing basis, which complies with the requirements in 10 CFR 50.48(a) and 10 CFR 50.48(c), as well as the guidance contained in Regulatory Guide 1.205, will not result in new or different kinds of accidents. The proposed amendment does not involve a significant change in the methods governing normal plant operation. The proposed change does not alter any safety analysis assumptions and is consistent with current plant operating practice regarding fire protection. No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures will be introduced as a result of this amendment. There will be no adverse impact or additional challenges imposed on any safety-related system as a result of the proposed change. No new modes of operation are introduced by the proposed amendment, nor will it create any failure mode not bounded by previously evaluated accidents. Further, the impacts of the proposed change are not directly assumed in any safety analysis to initiate an accident sequence.

The requirements in NFPA 805 address only fire protection, and the impacts of fire on the plant have been evaluated. The proposed fire protection program changes do not involve new failure mechanisms or malfunctions that could initiate a new or different kind of accident beyond those already analyzed in the FSAR. Based on this, as well as the discussion above, the

implementation of this amendment to transition the FPP at PLANT to one based on NFPA 805, in accordance with 10 CFR 50.48(c), does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Criterion 3: The Proposed Change Does Not Involve a Significant Reduction in a Margin of Safety

Operation of PLANT in accordance with the proposed amendment does not involve a significant reduction in a margin of safety. The transition to a new risk-informed, performance-based fire protection licensing basis that complies with the requirements in 10 CFR 50.48(a) and 10 CFR 50.48(c) does not alter the manner in which safety limits, limiting safety system settings, or limiting conditions for operation are determined. The safety analysis acceptance criteria are not affected by this change. The proposed amendment does not adversely affect existing plant safety margins or the reliability of equipment assumed in the FSAR to mitigate accidents. The proposed change does not adversely impact systems that respond to safely shut down the plant and maintain the plant in a safe shutdown condition. In addition, the proposed amendment will not result in plant operation in a configuration outside the design basis for an unacceptable period of time without implementation of appropriate compensatory measures.

The risk evaluations for plant changes, in part as they relate to the potential for reducing a safety margin, were measured quantitatively for acceptability using the delta risk (i.e., ΔCDF and ΔLERF) criteria from Section 5.3.5, "Acceptance Criteria," of NEI 04-02, as well as the guidance contained in Regulatory Guide 1.205. Engineering analyses, which may include engineering evaluations, probabilistic safety assessments, and fire modeling calculations, have been performed to demonstrate that the performance-based methods of NFPA 805 do not result in a significant reduction in the margin of safety. As such, the proposed changes are evaluated to ensure that risk and safety margins are kept within acceptable limits. Based on the above, the implementation of this amendment to transition the FPP at PLANT to one based on NFPA 805, in accordance with 10 CFR 50.48(c), will not significantly reduce a margin of safety.

NFPA 805 continues to protect public health and safety and the common defense and security because the overall approach of NFPA 805 is consistent with the key principles for evaluating risk-informed licensing basis changes, as described in Regulatory Guide 1.174, is consistent with the defense-in-depth philosophy, and maintains sufficient safety margins. Based on the above discussion, it appears that the three standards of 10 CFR 50.92(c) are satisfied. Therefore, the NRC staff has made a final determination that the amendment request to transition the FPP at the PLANT NAME, Unit X, to one based on NFPA 805, in accordance with 10 CFR 50.48(c), involves no significant hazards consideration.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of *[insert State]* official was notified on MONTH DAY, YEAR, of the proposed issuance of the amendment. The *[insert State]* State official had no comments.

7.0 ENVIRONMENTAL CONSIDERATION

Caution: The environmental consideration discussed below is written for a categorical exclusion based on 10 CFR 51.22(c)(9). The PM/LA are responsible to ensure that this is accurate for the specific amendment being issued.

The proposed amendment transitions the fire protection program at the FULL PLANT NAME, Unit X, to one based on NFPA 805, in accordance with 10 CFR 50.48(c), which subsequently impacts a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, as well as changing certain inspection and surveillance requirements.

Accordingly, the NRC staff evaluated the proposed change against the categorical exclusion requirements of 10 CFR 51.22(c)(9), which state that in order for a license amendment to be excluded from the need for an environmental review, it must meet the following criteria:

(i) The amendment involves no significant hazards consideration;

(ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; and

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives, and goals for radioactive releases to the environment. The radioactive release goals provide reasonable assurance that a fire will not result in a radiological release that affects the public, plant personnel, or the environment. The NFPA 805 transition has been evaluated based on fire suppression activities, but not involving fuel damage, and does not create any new source terms. Therefore, the proposed amendment will not change the types or amounts of any effluents that may be released offsite.

Furthermore, the proposed change will not significantly alter the types or increase the amount of individual or cumulative occupational radiation exposures based on the results of the evaluation performed regarding fire fighting activities. In addition, the modifications being implemented as a part of the transition to NFPA 805 at PLANT will reduce the need for recovery actions within the plant, which may function to lower overall operator occupational exposures in many scenarios.

Therefore, the NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final finding that the amendment involves no significant hazards consideration in Section 5.0, “Final No Significant Hazards Consideration,” of this safety evaluation. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

8.0 CONCLUSION

The NRC staff reviewed the licensee’s application, as supplemented, to transition to a risk-informed, performance-based fire protection program in accordance with the requirements established by NFPA 805. The staff concludes that the licensee’s approach, methods, and data are acceptable to establish, implement, and maintain a risk-informed, performance-based fire protection program in accordance with 10 CFR 50.48(c).

Implementation of the RI/PB FPP in accordance with 10 CFR 50.48(c) will include the application of a new fire protection license condition. The new license condition includes a list of modifications that must be completed in order to support the conclusions made in this safety evaluation, as well as an established date by which full compliance with 10 CFR 50.48(c) will be achieved. In addition, before the licensee is able to fully implement the transition to a fire protection program based on NFPA 805 and use the new fire protection license condition to its full extent, a number of implementation items must be completed within the timeframe specified.

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

9.0 REFERENCES

1. National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, National Fire Protection Association, Quincy, MA

2. NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," Revision 2, Nuclear Energy Institute, Washington, DC, April 2008 [ADAMS Accession No. ML081130188]

3. Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, U. S. Nuclear Regulatory Commission, Washington, DC, December 2009 [ADAMS Accession No. ML092730314]

4. Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 1, U. S. Nuclear Regulatory Commission, Washington, DC, November 2002 [ADAMS Accession No. ML023240437]

5. Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," Revision 2, U.S. Nuclear Regulatory Commission, Washington, DC, March 2009 [ADAMS Accession No. ML090410014] [[RG 1.200, Revision 1, January 2007 – ADAMS Accession No. ML070240001; Clarification to RG 1.200, Revision 1, July 2007 – ADAMS Accession No. ML071940235; Draft RG 1.200, Revision 1, was issued as DG-1161, September 2006 – ADAMS Accession No. ML062480134; RG 1.200, Revision 0, February 2004 – ADAMS Accession No. ML040630078; RG 1.200, Revision 0, was issued for trial use with SRP Chapter 19.1 – ADAMS Accession No. ML040630300; Draft RG 1.200, Revision 0, was issued as DG-1122, November 2002 – ADAMS Accession No. ML023360076]]

6. Regulatory Guide 1.189, "Fire Protection for Operating Nuclear Power Plants," Revision 2, U. S. Nuclear Regulatory Commission, Washington, DC, October 2009 [ADAMS Accession No. ML092580550]

7. Regulatory Guide 1.181, “Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e),” Revision 0, U. S. Nuclear Regulatory Commission, Washington, DC, September 1999 [ADAMS Accession No. ML003740112]

8. NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: Light Water Reactor Edition,” Section 9.5.1.2, “Risk-Informed, Performance-Based Fire Protection,” Revision 0, U. S. Nuclear Regulatory Commission, Washington, DC, October 2009 [ADAMS Accession No. ML092590527]

9. NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: Light Water Reactor Edition,” Section 19.1, “Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,” Revision 2, U. S. Nuclear Regulatory Commission, Washington, DC, June 2007 [ADAMS Accession No. ML071700657]

10. NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: Light Water Reactor Edition,” Section 19.2, “Review of Risk Information Used to Support Permanent Plant-Specific Changes to the Licensing Basis: General Guidance,” Revision 0, U. S. Nuclear Regulatory Commission, Washington, DC, June 2007 [ADAMS Accession No. ML071700658]

11. NUREG-1824, “Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications,” Volumes 1-7, U.S. Nuclear Regulatory Commission, Washington, DC, May 2007 [ADAMS Accession Nos. ML071650546 (volume 1), ML071730305 (volume 2), ML071730493 (volume 3), ML071730499 (volume 4), ML071730504 (volume 5), ML071730527 (volume 6), and ML071730543 (volume 7)]

12. NUREG-1852, “Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire,” U. S. Nuclear Regulatory Commission, Washington, DC, October 2007 [ADAMS Accession No. ML073020676]

13. NUREG/CR-6850, “EPRI/NRC-RES, Fire PRA Methodology for Nuclear Power Facilities,” Volumes 1 and 2, U. S. Nuclear Regulatory Commission, Washington, DC, September 2005 [ADAMS Accession Nos. ML052580075 (volume 1) and ML052580118 (volume 2)]

14. Generic Letter 1986-10, “Implementation of Fire Protection Requirements,” dated April 24, 1986, Supplement 1, “Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Safe Shutdown Trains Within the Same Fire Area,” dated March 25, 1994, U.S. Nuclear Regulatory Commission, Washington, DC

15. Regulatory Issue Summary 2007-19, “Process for Communicating Clarifications of Staff Positions Provided in Regulatory Guide 1.205 Concerning Issues Identified During the Pilot Application of National Fire Protection Association Standard 805,” Revision 0, U. S. Nuclear Regulatory Commission, Washington, DC, dated August 20, 2007 [ADAMS Accession No. ML071590227]

16. Regulatory Issue Summary 2004-03, “Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Inspections,” Revision 1, U. S. Nuclear Regulatory Commission, Washington, DC, dated December 29, 2004 [ADAMS Accession No. ML042440791]

17. Information Notice 92-18, “Potential for Loss of Remote Shutdown Capability During a Control Room Fire,” U. S. Nuclear Regulatory Commission, Washington, DC, dated February 28, 1992 [ADAMS Legacy Library Accession No. 9202240025]

18. Inspection Manual Chapter 0609, “Significance Determination Process,” Appendix G, “Shutdown Operations Significance Determination Process,” Attachment 2, “Phase 2 Significance Determination Process Template for PWR During Shutdown,” U. S. Nuclear Regulatory Commission, Washington, DC, February 2005 [ADAMS Accession No. ML051400248]

19. NEI 98-03, “Guidelines for Updating Final Safety Analysis Reports,” Revision 1, Nuclear Energy Institute, Washington, DC, June 1999 [ADAMS Accession No. ML003779028]

20. NEI 00-01, “Guidance for Post-Fire Safe Shutdown Circuit Analysis,” Revision 2, Nuclear Energy Institute, Washington, DC, December 2007 [ADAMS Accession No. ML091770265]

21. Draft NEI 04-06, “Guidance for Self-Assessment of Circuit Failure Issues,” Revision L, Nuclear Energy Institute, Washington, DC, March 2005 [ADAMS Accession No. ML050760219]

22. NEI 07-12, “Fire Probabilistic Risk Assessment Peer Review Process Guidance,” Revision 0, Nuclear Energy Institute, Washington, DC, November 2008 [ADAMS Accession No. ML083430464]

23. EPRI Technical Report 1006756, “Fire Protection Surveillance Optimization and Maintenance Guide for Fire Protection Systems and Features,” Electric Power Research Institute, Charlotte, NC, July 2003

24. EPRI Technical Report 1016735, “Fire PRA Methods Enhancements: Additions, Clarifications, and Refinements to EPRI 1011989 (NUREG/CR-6850),” Electric Power Research Institute, Palo Alto, CA, December 2008 [ADAMS Accession No. ML090290195]

25. EPRI Technical Report 1003111, “Fire Event Database and Generic Ignition Frequency Model for U.S. Nuclear Power Plants,” Electric Power Research Institute, Charlotte, NC, November 2001

26. NUMARC 93-01, “Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” Revision 2, Nuclear Energy Institute, Washington, DC, April 1996 [ADAMS Accession No. ML101020415]

27. NFPA 72, “National Fire Alarm and Signaling Code,” 2010 Edition, National Fire Protection Association, Quincy, MA

28. NFPA 76, “Standard for the Fire Protection of Telecommunications Facilities,” 2009 Edition, National Fire Protection Association, Quincy, MA

29. Draft ASME/ANS RA-S-2007, “Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications,” American Society of Mechanical Engineers and the American Nuclear Society, La Grange Park, IL, September 2007

30. ASME/ANS RA-Sa-2009, “Standard for Level 1 / Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications,” American Society of Mechanical Engineers and the American Nuclear Society, La Grange Park, IL, 2009

31. ASTM E 1355-05a, “Standard Guide for Evaluating Predictive Capability of Deterministic Fire Models,” American Society for Testing and Materials, West Conshohocken, PA

Principal Contributors: *[Review Lead]*, NRR
[List other review contributors], [Office]

Date: MONTH DAY, YEAR

Attachment A, NFPA 805 Chapter 3 Fundamental Elements Compliance Matrix

This attachment contains Table 3.1-1, which provides the specific fire protection program elements and minimum design requirements from NFPA 805 Chapter 3, as appropriately modified by 10 CFR 50.48(c). In addition, the table describes each fundamental fire protection program element from NFPA 805 Chapter 3 and identifies which of the methods listed below the licensee used as the means for achieving compliance with the requirement. Table 3.1-1 also provides the NRC staff's evaluation of the licensee's compliance statement for each fire protection program element. LAR Attachment A, "NEI 04-02 Table B-1, Transition of Fundamental FP Program & Design Elements," provides further details regarding the licensee's compliance strategy for specific NFPA 805 Chapter 3 requirements, including references to where compliance is documented.

As part of the assessment of its compliance with the NFPA 805 Chapter 3 elements, the licensee reviewed each section and subsection against the existing PLANT fire protection program and provided specific compliance statements for each NFPA 805 Chapter 3 attribute that contained applicable requirements. The methods used by PLANT for achieving compliance with the NFPA 805 Chapter 3 fundamental fire protection program elements and minimum design requirements are as follows:

1. The existing fire protection program element directly complies with the requirement; noted in LAR Attachment A, also called the B-1 Table, as "Complies." In assessing these statements, the NRC staff reviewed the provided information to ensure that it presented a reasonable basis for concluding that the existing fire protection program element was adequate to meet the associated NFPA 805 Chapter 3 element.

2. The existing fire protection program element complies through the use of an explanation or clarification; noted in the B-1 Table as "Complies with Clarification." In assessing these statements, the NRC staff reviewed the provided information to ensure that it presented a reasonable basis for concluding that the fire protection program element, as clarified by the supplemental information, was adequate to meet the NFPA 805 Chapter 3 element.

3. The existing fire protection program element complies with the requirement based on prior NRC approval of an alternative to the fundamental fire protection program attribute and the bases for the NRC approval remain valid; noted in the B-1 Table as "Complies Via Previous NRC Approval." In assessing these statements, the NRC staff reviewed the approved alternative to ensure that the basis was still valid for concluding that the alternative was adequate to meet the NFPA 805 Chapter 3 element.

4. The existing fire protection program element complies through the use of existing engineering equivalency evaluations (EEEEs) whose bases remain valid and are of sufficient quality; noted in the B-1 Table as "Complies with the Use of EEEEs." In assessing these statements, the NRC staff reviewed the EEEEs to ensure that the basis was still valid and of sufficient quality for concluding that the alternative was adequate to meet the NFPA 805 Chapter 3 element.

5. The existing fire protection program element does not comply with the requirement, but the licensee is requesting approval for a performance-based method in accordance with 10 CFR 50.48(c)(2)(vii); noted as "License Amendment Required."

Table 3.1-1: NFPA 805 Chapter 3 Fundamental Elements Compliance Matrix

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.1	**3.1* General.** This chapter contains the fundamental elements of the fire protection program and specifies the minimum design requirements for fire protection systems and features. These fire protection program elements and minimum design requirements shall not be subject to the performance-based methods permitted elsewhere in this standard. Previously approved alternatives from the fundamental protection program attributes of this chapter by the AHJ take precedence over the requirements contained herein.	[Insert the compliance statement from the LAR. Options include:] *[blank]* *OR* Complies *OR* Complies with Clarification *OR* Complies with Use of EEEEs *OR* Complies Via Previous NRC Approval *OR* License Amendment Required	[Provide an evaluation of the compliance statement. Options include, but are not limited to the following:] Subsection not reviewed for acceptability. *OR* The NRC staff finds the licensee's statement of compliance acceptable. *OR* The NRC staff finds that the licensee's explanation of their method of compliance with these requirements is acceptable based on the information provided in the associated B-1 table element. IMPLEMENTATION ITEM -- The licensee identified a implementation action to complete *[describe the action]* (SE Section 2.9; Item #X). *OR* The licensee stated that compliance has been demonstrated through the use of an engineering equivalency evaluation. Based on the licensee's justification of continued validity and evaluation quality, the NRC staff finds the licensee's statement of compliance acceptable. *OR*

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
			The NRC staff previously approved an alternative to this requirement that the licensee is carrying forward into the RI/PB FPP. *[Description of what the staff approved plus a reference.]* Based on the licensee's justification of continued validity, the NRC staff finds the licensee's statement of compliance acceptable. *OR* The NRC staff finds that the licensee's proposed performance based method to demonstrate compliance is acceptable as described in section *[3.1.4]* of this safety evaluation.
3.2	**3.2 Fire Protection Plan.**		
3.2.1	**3.2.1 Intent.** A site-wide fire protection plan shall be established. This plan shall document management policy and program direction and shall define the responsibilities of those individuals responsible for the plan's implementation. This section establishes the criteria for an integrated combination of components, procedures, and personnel to implement all fire protection program activities.		
3.2.2	**3.2.2* Management Policy Direction and Responsibility.** A policy document shall be prepared that defines management authority and responsibilities and establishes the general policy for the site fire protection program.		
3.2.2.1	**3.2.2.1*** The policy document shall designate the senior management position with		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	immediate authority and responsibility for the fire protection program.		
3.2.2.2	**3.2.2.2*** The policy document shall designate a position responsible for the daily administration and coordination of the fire protection program and its implementation.		
3.2.2.3	**3.2.2.3*** The policy document shall define the fire protection interfaces with other organizations and assign responsibilities for the coordination of activities. In addition, this policy document shall identify the various plant positions having the authority for implementing the various areas of the fire protection program.		
3.2.2.4	**3.2.2.4*** The policy document shall identify the appropriate AHJ for the various areas of the fire protection program.		
3.2.3	**3.2.3* Procedures.** Procedures shall be established for implementation of the fire protection program. In addition to procedures that could be required by other sections of the standard, the procedures to accomplish the following shall be established:		
3.2.3.(1)	(1)* Inspection, testing, and maintenance for fire protection systems and features credited by the fire protection program		
3.2.3.(2)	(2)* Compensatory actions implemented when fire protection systems and other systems credited by the fire protection program and this standard cannot perform their intended function and limits on impairment duration		
3.2.3.(3)	(3)* Reviews of fire protection program —		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	related performance and trends		
3.2.3.(4)	(4) Reviews of physical plant modifications and procedure changes for impact on the fire protection program		
3.2.3.(5)	(5) Long-term maintenance and configuration of the fire protection program		
3.2.3.(6)	(6) Emergency response procedures for the plant industrial fire brigade		
3.3	**3.3 Prevention.** A fire prevention program with the goal of preventing a fire from starting shall be established, documented, and implemented as part of the fire protection program. The two basic components of the fire prevention program shall consist of both of the following:		
3.3.(1)	(1) Prevention of fires and fire spread by controls on operational activities		
3.3.(2)	(2) Design controls that restrict the use of combustible materials The design control requirements listed in the remainder of this section shall be provided as described.		
3.3.1	**3.3.1 Fire Prevention for Operational Activities.** The fire prevention program activities shall consist of the necessary elements to address the control of ignition sources and the use of transient combustible materials during all aspects of plant operations. The fire prevention program shall focus on the human and programmatic elements necessary to prevent fires from starting or, should a fire start, to keep the fire as small as possible.		
3.3.1.1	**3.3.1.1 General Fire Prevention Activities.** The fire prevention activities shall include but not be limited to the following program		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	elements:		
3.3.1.1.(1)	(1) Training on fire safety information for all employees and contractors including, as a minimum, familiarization with plant fire prevention procedures, fire reporting, and plant emergency alarms		
3.3.1.1.(2)	(2)* Documented plant inspections including provisions for corrective actions for conditions where unanalyzed fire hazards are identified		
3.3.1.1.(3)	(3)* Administrative controls addressing the review of plant modifications and maintenance to ensure that both fire hazards and the impact on plant fire protection systems and features are minimized		
3.3.1.2	**3.3.1.2* Control of Combustible Materials.** Procedures for the control of general housekeeping practices and the control of transient combustibles shall be developed and implemented. These procedures shall include but not be limited to the following program elements:		
3.3.1.2.(1)	(1)* Wood used within the power block shall be listed pressure- impregnated or coated with a listed fire-retardant application. *Exception: Cribbing timbers 6 in. by 6 in. (15.2 cm by 15.2 cm) or larger shall not be required to be fire-retardant treated.*		
3.3.1.2.(2)	(2) Plastic sheeting materials used in the power block shall be fire-retardant types that have passed NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*, large-scale tests, or equivalent.		
3.3.1.2.(3)	(3) Waste, debris, scrap, packing materials, or other combustibles shall be removed from an		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	area immediately following the completion of work or at the end of the shift, whichever comes first.		
3.3.1.2.(4)	(4)* Combustible storage or staging areas shall be designated, and limits shall be established on the types and quantities of stored materials.		
3.3.1.2.(5)	(5)* Controls on use and storage of flammable and combustible liquids shall be in accordance with NFPA 30, *Flammable and Combustible Liquids Code*, or other applicable NFPA standards.		
3.3.1.2.(6)	(6)* Controls on use and storage of flammable gases shall be in accordance with applicable NFPA standards.		
3.3.1.3	**3.3.1.3 Control of Ignition Sources.**		
3.3.1.3.1	**3.3.1.3.1*** A hot work safety procedure shall be developed, implemented, and periodically updated as necessary in accordance with NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* and NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*.		
3.3.1.3.2	**3.3.1.3.2** Smoking and other possible sources of ignition shall be restricted to properly designated and supervised safe areas of the plant.		
3.3.1.3.3	**3.3.1.3.3** Open flames or combustion-generated smoke shall not be permitted for leak or air flow testing.		
3.3.1.3.4	**3.3.1.3.4*** Plant administrative procedure shall control the use of portable electrical heaters in the plant. Portable fuel-fired heaters shall not be permitted in plant areas containing		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	equipment important to nuclear safety or where there is a potential for radiological releases resulting from a fire.		
3.3.2	**3.3.2 Structural.** Walls, floors, and components required to maintain structural integrity shall be of noncombustible construction, as defined in NFPA 220, *Standard on Types of Building Construction*.		
3.3.3	**3.3.3 Interior Finishes.** Interior wall or ceiling finish classification shall be in accordance with NFPA *101*®, *Life Safety Code*®, requirements for Class A materials. Interior floor finishes shall be in accordance with NFPA *101* requirements for Class I interior floor finishes.		
3.3.4	**3.3.4 Insulation Materials.** Thermal insulation materials, radiation shielding materials, ventilation duct materials, and soundproofing materials shall be noncombustible or limited combustible.		
3.3.5	**3.3.5 Electrical.**		
3.3.5.1	**3.3.5.1** Wiring above suspended ceiling shall be kept to a minimum. Where installed, electrical wiring shall be listed for plenum use, routed in armored cable, routed in metallic conduit, or routed in cable trays with solid metal top and bottom covers.		
3.3.5.2	**3.3.5.2** Only metal tray and metal conduits shall be used for electrical raceways. Thin wall metallic tubing shall not be used for power, instrumentation, or control cables. Flexible metallic conduits shall only be used in short lengths to connect components.		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.3.5.3	**3.3.5.3*** Electric cable construction shall comply with a flame propagation test as acceptable to the AHJ. [Note: This entry modified per 10 CFR 50.48(c)(2)(v)]		
3.3.6	**3.3.6 Roofs.** Metal roof deck construction shall be designed and installed so the roofing system will not sustain a self-propagating fire on the underside of the deck when the deck is heated by a fire inside the building. Roof coverings shall be Class A as determined by tests described in NFPA 256, *Standard Methods of Fire Tests of Roof Coverings*.		
3.3.7	**3.3.7 Bulk Flammable Gas Storage.** Bulk compressed or cryogenic flammable gas storage shall not be permitted inside structures housing systems, equipment, or components important to nuclear safety.		
3.3.7.1	**3.3.7.1** Storage of flammable gas shall be located outdoors, or in separate detached buildings, so that a fire or explosion will not adversely impact systems, equipment, or components important to nuclear safety. NFPA 50A, *Standard for Gaseous Hydrogen Systems at Consumer Sites*, shall be followed for hydrogen storage.		
3.3.7.2	**3.3.7.2** Outdoor high-pressure flammable gas		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	storage containers shall be located so that the long axis is not pointed at buildings.		
3.3.7.3	**3.3.7.3** Flammable gas storage cylinders not required for normal operation shall be isolated from the system.		
3.3.8	**3.3.8 Bulk Storage of Flammable and Combustible Liquids.** Bulk storage of flammable and combustible liquids shall not be permitted inside structures containing systems, equipment, or components important to nuclear safety. As a minimum, storage and use shall comply with NFPA 30, *Flammable and Combustible Liquids Code*.		
3.3.9	**3.3.9* Transformers.** Where provided, transformer oil collection basins and drain paths shall be periodically inspected to ensure that they are free of debris and capable of performing their design function.		
3.3.10	**3.3.10* Hot Pipes and Surfaces.** Combustible liquids, including high flashpoint lubricating oils, shall be kept from coming in contact with hot pipes and surfaces, including insulated pipes and surfaces. Administrative controls shall require the prompt cleanup of oil on insulation.		
3.3.11	**3.3.11 Electrical Equipment.** Adequate clearance, free of combustible material, shall be maintained around energized electrical equipment.		
3.3.12	**3.3.12* Reactor Coolant Pumps.** For facilities with non-inerted containments, reactor coolant pumps with an external lubrication system shall be provided with an oil collection system. The		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	oil collection system shall be designed and installed such that leakage from the oil system is safely contained for off normal conditions such as accident conditions or earthquakes. All of the following shall apply.		
3.3.12.(1)	(1) The oil collection system for each reactor coolant pump shall be capable of collecting lubricating oil from all potential pressurized and nonpressurized leakage sites in each reactor coolant pump oil system.		
3.3.12.(2)	(2) Leakage shall be collected and drained to a vented closed container that can hold the inventory of the reactor coolant pump lubricating oil system.		
3.3.12.(3)	(3) A flame arrestor is required in the vent if the flash point characteristics of the oil present the hazard of a fire flashback.		
3.3.12.(4)	(4) Leakage points on a reactor coolant pump motor to be protected shall include but not be limited to the lift pump and piping, overflow lines, oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and the oil reservoirs, where such features exist on the reactor coolant pumps.		
3.3.12.(5)	(5) The collection basin drain line to the collection tank shall be large enough to accommodate the largest potential oil leak such that oil leakage does not overflow the basin.		
3.4	**3.4 Industrial Fire Brigade.**		
3.4.1	**3.4.1 On-Site Fire-Fighting Capability.** All of the following requirements shall apply.		
3.4.1.(a)	(a) A fully staffed, trained, and equipped fire-fighting force shall be available at all times to		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	control and extinguish all fires on site. This force shall have a minimum complement of five persons on duty and shall conform with the following NFPA standards as applicable:		
3.4.1.(a).(1)	(1) NFPA 600, *Standard on Industrial Fire Brigades* (interior structural fire fighting)		
3.4.1.(a).(2)	(2) NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*		
3.4.1.(a).(3)	(3) NFPA 1582, *Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians*		
3.4.1.(b)	(b)*Industrial fire brigade members shall have no other assigned normal plant duties that would prevent immediate response to a fire or other emergency as required.		
3.4.1.(c)	(c) During every shift, the brigade leader and at least two brigade members shall have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance criteria. *Exception to (c): Sufficient training and knowledge shall be permitted to be provided by an operations advisor dedicated to industrial fire brigade support.*		
3.4.1.(d)	(d)*The industrial fire brigade shall be notified immediately upon verification of a fire.		
3.4.1.(e)	(e) Each industrial fire brigade member shall pass an annual physical examination to determine that he or she can perform the strenuous activity required during manual firefighting operations. The physical examination shall determine the ability of each member to use respiratory protection		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	equipment.		
3.4.2	**3.4.2* Pre-Fire Plans.** Current and detailed pre-fire plans shall be available to the industrial fire brigade for all areas in which a fire could jeopardize the ability to meet the performance criteria described in Section 1.5.		
3.4.2.1	**3.4.2.1*** The plans shall detail the fire area configuration and fire hazards to be encountered in the fire area, along with any nuclear safety components and fire protection systems and features that are present.		
3.4.2.2	**3.4.2.2** Pre-fire plans shall be reviewed and updated as necessary.		
3.4.2.3	**3.4.2.3*** Pre-fire plans shall be available in the control room and made available to the plant industrial fire brigade.		
3.4.2.4	**3.4.2.4*** Pre-fire plans shall address coordination with other plant groups during fire emergencies.		
3.4.3	**3.4.3 Training and Drills.** Industrial fire brigade members and other plant personnel who would respond to a fire in conjunction with the brigade shall be provided with training commensurate with their emergency responsibilities.		
3.4.3.(a)	(a) *Plant Industrial Fire Brigade Training*. All of the following requirements shall apply.		
3.4.3.(a).(1)	(1) Plant industrial fire brigade members shall receive training consistent with the requirements contained in NFPA 600, *Standard on Industrial Fire Brigades*, or NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, as appropriate.		
3.4.3.(a).(2)	(2) Industrial fire brigade members shall be		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	given quarterly training and practice in fire fighting, including radioactivity and health physics considerations, to ensure that each member is thoroughly familiar with the steps to be taken in the event of a fire.		
3.4.3.(a).(3)	(3) A written program shall detail the industrial fire brigade training program.		
3.4.3.(a).(4)	(4) Written records that include but are not limited to initial industrial fire brigade classroom and hands-on training, refresher training, special training schools attended, drill attendance records, and leadership training for industrial fire brigades shall be maintained for each industrial fire brigade member.		
3.4.3.(b)	(b) *Training for Non-Industrial Fire Brigade Personnel.* Plant personnel who respond with the industrial fire brigade shall be trained as to their responsibilities, potential hazards to be encountered, and interfacing with the industrial fire brigade.		
3.4.3.(c)	(c)**Drills*. All of the following requirements shall apply.		
3.4.3.(c).(1)	(1) Drills shall be conducted quarterly for each shift to test the response capability of the industrial fire brigade.		
3.4.3.(c).(2)	(2) Industrial fire brigade drills shall be developed to test and challenge industrial fire brigade response, including brigade performance as a team, proper use of equipment, effective use of pre-fire plans, and coordination with other groups. These drills shall evaluate the industrial fire brigade's abilities to react, respond, and demonstrate proper fire-fighting techniques to control and		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	extinguish the fire and smoke conditions being simulated by the drill scenario.		
3.4.3.(c).(3)	(3) Industrial fire brigade drills shall be conducted in various plant areas, especially in those areas identified to be essential to plant operation and to contain significant fire hazards.		
3.4.3.(c).(4)	(4) Drill records shall be maintained detailing the drill scenario, industrial fire brigade member response, and ability of the industrial fire brigade to perform as a team.		
3.4.3.(c).(5)	(5) A critique shall be held and documented after each drill.		
3.4.4	**3.4.4 Fire-Fighting Equipment.** Protective clothing, respiratory protective equipment, radiation monitoring equipment, personal dosimeters, and fire suppression equipment such as hoses, nozzles, fire extinguishers, and other needed equipment shall be provided for the industrial fire brigade. This equipment shall conform with the applicable NFPA standards.		
3.4.5	**3.4.5 Off-Site Fire Department Interface.**		
3.4.5.1	**3.4.5.1 Mutual Aid Agreement.** Off-site fire authorities shall be offered a plan for their interface during fires and related emergencies on site.		
3.4.5.2	**3.4.5.2* Site-Specific Training.** Fire fighters from the off-site fire authorities who are expected to respond to a fire at the plant shall be offered site-specific training and shall be invited to participate in a drill at least annually.		
3.4.5.3	**3.4.5.3* Security and Radiation Protection.** Plant security and radiation protection plans shall address off-site fire authority response.		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.4.6	**3.4.6* Communications.** An effective emergency communications capability shall be provided for the industrial fire brigade.		
3.5	**3.5 Water Supply.**		
3.5.1	**3.5.1** A fire protection water supply of adequate reliability, quantity, and duration shall be provided by one of the two following methods. (a) Provide a fire protection water supply of not less than two separate 300,000-gal (1,135,500-L) supplies. (b) Calculate the fire flow rate for 2 hours. This fire flow rate shall be based on 500 gpm (1892.5 L/min) for manual hose streams plus the largest design demand of any sprinkler or fixed water spray system(s) in the power block as determined in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems,* or NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection.* The fire water supply shall be capable of delivering this design demand with the hydraulically least demanding portion of fire main loop out of service.		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.5.2	**3.5.2*** The tanks shall be interconnected such that fire pumps can take suction from either or both. A failure in one tank or its piping shall not allow both tanks to drain. The tanks shall be designed in accordance with NFPA 22, *Standard for Water Tanks for Private Fire Protection*. *Exception No. 1: Water storage tanks shall not be required when fire pumps are able to take suction from a large body of water (such as a lake), provided each fire pump has its own suction and both suctions and pumps are adequately separated.* *Exception No. 2: Cooling tower basins shall be an acceptable water source for fire pumps when the volume is sufficient for both purposes and water quality is consistent with the demands of the fire service.*		
3.5.3	**3.5.3*** Fire pumps, designed and installed in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, shall be provided to ensure that 100 percent of the required flow rate and pressure are available assuming failure of the largest pump or pump power source.		
3.5.4	**3.5.4** At least one diesel engine-driven fire pump or two more seismic Category I Class IE electric motor-driven fire pumps connected to redundant Class IE emergency power buses capable of providing 100 percent of the required flow rate and pressure shall be provided.		
3.5.5	**3.5.5** Each pump and its driver and controls		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	shall be separated from the remaining fire pumps and from the rest of the plant by rated fire barriers.		
3.5.6	**3.5.6** Fire pumps shall be provided with automatic start and manual stop only.		
3.5.7	**3.5.7** Individual fire pump connections to the yard fire main loop shall be provided and separated with sectionalizing valves between connections.		
3.5.8	**3.5.8** A method of automatic pressure maintenance of the fire protection water system shall be provided independent of the fire pumps.		
3.5.9	**3.5.9** Means shall be provided to immediately notify the control room, or other suitable constantly attended location, of operation of fire pumps.		
3.5.10	**3.5.10** An underground yard fire main loop, designed and installed in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, shall be installed to furnish anticipated water requirements.		
3.5.11	**3.5.11** Means shall be provided to isolate portions of the yard fire main loop for maintenance or repair without simultaneously shutting off the supply to both fixed fire suppression systems and fire hose stations provided for manual backup. Sprinkler systems and manual hose station standpipes shall be connected to the plant fire protection water main so that a single active failure or a crack to the water supply piping to these systems can be isolated so as not to impair both the primary		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	and backup fire suppression systems.		
3.5.12	**3.5.12** Threads compatible with those used by local fire departments shall be provided on all hydrants, hose couplings, and standpipe risers. *Exception: Fire departments shall be permitted to be provided with adapters that allow interconnection between plant equipment and the fire department equipment if adequate training and procedures are provided.*		
3.5.13	**3.5.13** Headers fed from each end shall be permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI B31.1, *Code for Power Piping*, are used for the headers (up to and including the first valve) supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system. Where provided, such headers shall be considered an extension of the yard main system. Each sprinkler and standpipe system shall be equipped with an outside screw and yoke (OS&Y) gate valve or other approved shutoff valve.		
3.5.14	**3.5.14*** All fire protection water supply and fire suppression system control valves shall be under a periodic inspection program and shall be supervised by one of the following methods. (a) Electrical supervision with audible and visual signals in the main control room or other suitable constantly attended location. (b) Locking valves in their normal position. Keys shall be made available only to authorized personnel.		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	(c) Sealing valves in their normal positions. This option shall be utilized only where valves are located within fenced areas or under the direct control of the owner/operator.		
3.5.15	**3.5.15** Hydrants shall be installed approximately every 250 ft (76 m) apart on the yard main system. A hose house equipped with hose and combination nozzle and other auxiliary equipment specified in NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* shall be provided at intervals of not more than 1000 ft (305 m) along the yard main system. *Exception: Mobile means of providing hose and associated equipment, such as hose carts or trucks, shall be permitted in lieu of hose houses. Where provided, such mobile equipment shall be equivalent to the equipment supplied by three hose houses.*		
3.5.16	**3.5.16*** The fire protection water supply system shall be dedicated for fire protection use only. *Exception No. 1: Fire protection water supply systems shall be permitted to be used to provide backup to nuclear safety systems, provided the fire protection water supply systems are designed and maintained to deliver the combined fire and nuclear safety flow demands for the duration specified by the applicable analysis.* *Exception No. 2: Fire protection water storage can be provided by plant systems serving other functions, provided the storage has a dedicated capacity capable of providing the maximum fire protection demand for the specified duration as*		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	determined in this section.		
3.6	**3.6 Standpipe and Hose Stations.**		
3.6.1	**3.6.1** For all power block buildings, Class III standpipe and hose systems shall be installed in accordance with NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems*.		
3.6.2	**3.6.2** A capability shall be provided to ensure an adequate water flow rate and nozzle pressure for all hose stations. This capability includes the provision of hose station pressure reducers where necessary for the safety of plant industrial fire brigade members and off-site fire department personnel.		
3.6.3	**3.6.3** The proper type of hose nozzle to be supplied to each power block area shall be based on the area fire hazards. The usual combination spray/straight stream nozzle shall not be used in areas where the straight stream can cause unacceptable damage or present an		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	electrical hazard to fire-fighting personnel. Listed electrically safe fixed fog nozzles shall be provided at locations where high-voltage shock hazards exist. All hose nozzles shall have shutoff capability and be able to control water flow from full open to full closed.		
3.6.4	**3.6.4** Provisions shall be made to supply water at least to standpipes and hose stations for manual fire suppression in all areas containing systems and components needed to perform the nuclear safety functions in the event of a safe shutdown earthquake (SSE). [Note: This entry modified per 10 CFR 50.48(c)(2)(vi)]		
3.6.5	**3.6.5** Where the seismic required hose stations are cross-connected to essential seismic non-fire protection water supply systems, the fire flow shall not degrade the essential water system requirement.		
3.7	**3.7 Fire Extinguishers.** Where provided, fire extinguishers of the appropriate number, size, and type shall be provided in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*. Extinguishers shall be permitted to be positioned outside of fire areas due to radiological conditions.		
3.8	**3.8 Fire Alarm and Detection Systems.**		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.8.1	**3.8.1 Fire Alarm.** Alarm initiating devices shall be installed in accordance with NFPA 72, *National Fire Alarm Code*®. Alarm annunciation shall allow the proprietary alarm system to transmit fire-related alarms, supervisory signals, and trouble signals to the control room or other constantly attended location from which required notifications and response can be initiated. Personnel assigned to the proprietary alarm station shall be permitted to have other duties. The following fire-related signals shall be transmitted:		
3.8.1.(1)	(1) Actuation of any fire detection device		
3.8.1.(2)	(2) Actuation of any fixed fire suppression system		
3.8.1.(3)	(3) Actuation of any manual fire alarm station		
3.8.1.(4)	(4) Starting of any fire pump		
3.8.1.(5)	(5) Actuation of any fire protection supervisory device		
3.8.1.(6)	(6) Indication of alarm system trouble condition		
3.8.1.1	**3.8.1.1** Means shall be provided to allow a person observing a fire at any location in the plant to quickly and reliably communicate to the control room or other suitable constantly attended location.		
3.8.1.2	**3.8.1.2** Means shall be provided to promptly notify the following of any fire emergency in such a way as to allow them to determine an appropriate course of action:		
3.8.1.2.(1)	(1) General site population in all occupied areas		
3.8.1.2.(2)	(2) Members of the industrial fire brigade and other groups supporting fire emergency response		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.8.1.2.(3)	(3) Off-site fire emergency response agencies. Two independent means shall be available (e.g., telephone and radio) for notification of off-site emergency services.		
3.8.2	**3.8.2 Detection.** If automatic fire detection is required to meet the performance or deterministic requirements of Chapter 4, then these devices shall be installed in accordance with NFPA 72, *National Fire Alarm Code*, and its applicable appendixes.		
3.9	**3.9 Automatic and Manual Water-Based Fire Suppression Systems.**		
3.9.1	**3.9.1*** If an automatic or manual water-based fire suppression system is required to meet the performance or deterministic requirements of Chapter 4, then the system shall be installed in accordance with the appropriate NFPA standards including the following:		
3.9.1.(1)	(1) NFPA 13, *Standard for the Installation of Sprinkler Systems*		
3.9.1.(2)	(2) NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*		
3.9.1.(3)	(3) NFPA 750, *Standard on Water Mist Fire Protection Systems*		
3.9.1.(4)	(4) NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*		
3.9.2	**3.9.2** Each system shall be equipped with a water flow alarm.		
3.9.3	**3.9.3** All alarms from fire suppression systems shall annunciate in the control room or other suitable constantly attended location.		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.9.4	**3.9.4** Diesel-driven fire pumps shall be protected by automatic sprinklers.		
3.9.5	**3.9.5** Each system shall be equipped with an OS&Y gate valve or other approved shutoff valve.		
3.9.6	**3.9.6** All valves controlling water-based fire suppression systems required to meet the performance or deterministic requirements of Chapter 4 shall be supervised as described in 3.5.14.		
3.10	**3.10 Gaseous Fire Suppression Systems.**		
3.10.1	**3.10.1** If an automatic total flooding and local application gaseous fire suppression system is required to meet the performance or deterministic requirements of Chapter 4, then the system shall be designed and installed in accordance with the following applicable NFPA codes:		
3.10.1.(1)	(1) NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*		
3.10.1.(2)	(2) NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*		
3.10.1.(3)	(3) NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.10.2	**3.10.2** Operation of gaseous fire suppression systems shall annunciate and alarm in the control room or other constantly attended location identified.		
3.10.3	**3.10.3** Ventilation system design shall take into account prevention from over-pressurization during agent injection, adequate sealing to prevent loss of agent, and confinement of radioactive contaminants.		
3.10.4	**3.10.4*** In any area required to be protected by both primary and backup gaseous fire suppression systems, a single active failure or a crack in any pipe in the fire suppression system shall not impair both the primary and backup fire suppression capability.		
3.10.5	**3.10.5** Provisions for locally disarming automatic gaseous suppression systems shall be secured and under strict administrative control.		
3.10.6	**3.10.6*** Total flooding carbon dioxide systems shall not be used in normally occupied areas.		
3.10.7	**3.10.7** Automatic total flooding carbon dioxide systems shall be equipped with an audible pre-discharge alarm and discharge delay sufficient to permit egress of personnel. The carbon dioxide system shall be provided with an odorizer.		
3.10.8	**3.10.8** Positive mechanical means shall be provided to lock out total flooding carbon dioxide systems during work in the protected space.		
3.10.9	**3.10.9** The possibility of secondary thermal shock (cooling) damage shall be considered during the design of any gaseous fire		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	suppression system, but particularly with carbon dioxide.		
3.10.10	**3.10.10** Particular attention shall be given to corrosive characteristics of agent decomposition products on safety systems.		
3.11	**3.11 Passive Fire Protection Features.** This section shall be used to determine the design and installation requirements for passive protection features. Passive fire protection features include wall, ceiling, and floor assemblies, fire doors, fire dampers, and through fire barrier penetration seals. Passive fire protection features also include electrical raceway fire barrier systems (ERFBS) that are provided to protect cables and electrical components and equipment from the effects of fire.		
3.11.1	**3.11.1 Building Separation.** Each major building within the power block shall be separated from the others by barriers having a designated fire resistance rating of 3 hours or by open space of at least 50 ft (15.2 m) or space that meets the requirements of NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*. Exception*: Where a performance-based analysis determines the adequacy of building separation, the requirements of 3.11.1 shall not apply.*		
3.11.2	**3.11.2 Fire Barriers.** Fire barriers required by Chapter 4 shall include a specific fire-resistance rating. Fire barriers shall be designed and installed to meet the specific fire resistance rating using assemblies qualified by		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	fire tests. The qualification fire tests shall be in accordance with NFPA 251, *Standard Methods of Tests of Fire Endurance of Building Construction and Materials*, or ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*.		
3.11.3	**3.11.3* Fire Barrier Penetrations.** Penetrations in fire barriers shall be provided with listed fire-rated door assemblies or listed rated fire dampers having a fire resistance rating consistent with the designated fire resistance rating of the barrier as determined by the performance requirements established by Chapter 4. *(See 3.11.3.4 for penetration seals for through penetration fire stops.)* Passive fire protection devices such as doors and dampers shall conform with the following NFPA standards, as applicable: (1) NFPA 80, *Standard for Fire Doors and Fire Windows* (2) NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems* (3) NFPA *101*, *Life Safety Code* *Exception: Where fire area boundaries are not wall-to-wall, floor-to-ceiling boundaries with all penetrations sealed to the fire rating required of the boundaries, a performance-based analysis shall be required to assess the adequacy of fire barrier forming the fire boundary to determine if the barrier will withstand the fire effects of the hazards in the area. Openings in fire barriers shall be permitted to be protected by other means as acceptable to the AHJ.*		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.11.4	**3.11.4* Through Penetration Fire Stops.** Through penetration fire stops for penetrations such as pipes, conduits, bus ducts, cables, wires, pneumatic tubes and ducts, and similar building service equipment that pass through fire barriers shall be protected as follows. (a) The annular space between the penetrating item and the through opening in the fire barrier shall be filled with a qualified fire-resistive penetration seal assembly capable of maintaining the fire resistance of the fire barrier. The assembly shall be qualified by tests in accordance with a fire test protocol acceptable to the AHJ or be protected by a listed fire-rated device for the specified fire-resistive period. (b) Conduits shall be provided with an internal fire seal that has an equivalent fire-resistive rating to that of the fire barrier through opening fire stop and shall be permitted to be installed on either side of the barrier in a location that is as close to the barrier as possible. *Exception: Openings inside conduit 4 in. (10.2 cm) or less in diameter shall be sealed at the fire barrier with a fire-rated internal seal unless the conduit extends greater than 5 ft (1.5 m) on each side of the fire barrier. In this case the conduit opening shall be provided with noncombustible material to prevent the passage of smoke and hot gases. The fill depth of the material packed to a depth of 2 in. (5.1 cm) shall constitute an acceptable smoke and hot gas seal in this application.*		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
3.11.5	**3.11.5* Electrical Raceway Fire Barrier Systems (ERFBS).** ERFBS required by Chapter 4 shall be capable of resisting the fire effects of the hazards in the area. ERFBS shall be tested in accordance with and shall meet the acceptance criteria of NRC Generic Letter 86-10, Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Safe Shutdown Trains Within the Same Fire Area." The ERFBS needs to adequately address the design requirements and limitations of supports and intervening items and their impact on the fire barrier system rating. The fire barrier system's ability to maintain the required nuclear safety circuits free of fire damage for a specific thermal exposure, barrier design, raceway size and type, cable size, fill, and type shall be demonstrated. *Exception No. 1: When the temperatures inside the fire barrier system exceed the maximum temperature allowed by the acceptance criteria of Generic Letter 86-10, "Fire Endurance Acceptance Test Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Training Within the Same Fire Area," Supplement 1, functionality of the cable at these elevated temperatures shall be*		

Element	Requirement	PLANT Compliance Statement	NRC Staff Evaluation
	demonstrated. Qualification demonstration of these cables shall be performed in accordance with the electrical testing requirements of Generic Letter 86-10, Supplement 1, Attachment 1, "Attachment Methods for Demonstrating Functionality of Cables Protected by Raceway Fire Barrier Systems During and After Fire Endurance Test Exposure." *Exception No. 2: ERFBS systems employed prior to the issuance of Generic Letter 86-10, Supplement 1, are acceptable providing that the system successfully met the limiting end point temperature requirements as specified by the AHJ at the time of acceptance.*		

Attachment B, Nuclear Safety Capability Assessment Method Review

Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, endorses NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," Revision 2, and Chapter 3 of NEI 00-01, Revision 2, "Guidance for Post-Fire Safe Shutdown Circuit Analysis", and promulgates the method outlined in NEI 04-02 for conducting a nuclear safety capability assessment. This NRC-endorsed method documents in a table format (i.e., NEI 04-02 Table B-2, "NFPA 805 Chapter 2 – Nuclear Safety Transition – Methodology Review") the licensee's comparison of its post-fire safe shutdown analyses to the guidance in NEI 00-01 Chapter 3, which has been determined to address the related requirements of NFPA 805, Section 2.4.2, "Nuclear Safety Capability Assessment."

This attachment contains Table 3.2-1, which identifies each applicable NEI 00-01 guidance section, documents whether the licensee stated that it met the guidance or provided justification for meeting the intent of that guidance, and presents the staff's evaluation of each NEI 00-01 Chapter 3 attribute for which the licensee stated its process/justification for meeting the intent of the guidance.

Table 3.2-1: Nuclear Safety Capability Assessment Method Review

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
3.0	Deterministic Methodology	*[Describe the content from the LAR regarding the alignment of the NSCA method with the guidance in NEI 00-01]*	*[Provide an evaluation of the alignment statement. For example:]* The NRC staff finds the licensee's statement of alignment to the endorsed guidance acceptable.
3.1 [A.Intro]	Safe Shutdown Systems and Path Development		
3.1 [B.Goals]	Safe Shutdown Systems and Path Development		
3.1 [C.Spurious Operations]	Safe Shutdown Systems and Path Development		
3.1.1	Criteria/Assumptions		
3.1.1.1	[GE BWR Paths]		
3.1.1.2	[SRVs/LP systems		
3.1.1.3	[Pressurizer Heaters]		
3.1.1.4	[Alternative Shutdown Capability		
3.1.1.5	[Initial Conditions]		
3.1.1.6	[Other Events in Conjunction with Fire]		
3.1.1.7	[Offsite Power]		
3.1.1.8	[Safety-Related Equipment]		
3.1.1.9	[72 Hour Coping]		
3.1.1.10	[Manual/Automatic		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
	Initiation of Systems]		
3.1.1.11	[Multiple Affected Units]		
3.1.2	Shutdown Functions		
3.1.2.1	Reactivity Control		
3.1.2.2	Pressure Control Systems		
3.1.2.3	Inventory Control		
3.1.2.4	Decay Heat Removal		
3.1.2.5	Process Monitoring		
3.1.2.6	Support Systems		
3.1.2.6.1	Electrical Systems		
3.1.2.6.2	Cooling Systems [HVAC]		
3.1.2.6.2	Cooling Systems [Main Section]		
3.1.3	Methodology for Safe Shutdown System Selection		
3.1.3.1	Identify Safe Shutdown Functions		
3.1.3.2	Identify Combinations of Systems that Satisfy Each Safe Shutdown function		
3.1.3.3	Define Combinations of Systems for Each Safe Shutdown Path		
3.1.3.4	Assign Shutdown Paths to Each		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
	Combination of Systems		
3.2	Safe Shutdown Equipment Selection		
3.2.1	Criteria/Assumptions		
3.2.1.1	[Primary Secondary Components]		
3.2.1.2	[Fire Damage to Mechanical Components (not electrically supervised]		
3.2.1.3	[Manual Valve Positions]		
3.2.1.4	Check Valves		
3.2.1.5	Instrument Failures		
3.2.1.6	[Spurious Components]		
3.2.1.7	[Instrument Tubing]		
3.2.2	Methodology for Equipment Selection		
3.2.2.1	Identify the System Flow Path for Each Shutdown Path,		
3.2.2.2	Identify the Equipment in Each Safe Shutdown System Flow Path Including Equipment That May Spuriously Operate and Affect		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
	System Operation		
3.2.2.3	Develop a Safe Shutdown Equipment List and Assign the Corresponding System and Safe Shutdown Path(s) to Each		
3.2.2.4	Identify Equipment Information Required for the Safe Shutdown Analysis		
3.2.2.5	Identify Dependencies Between Equipment, Supporting Equipment, Safe Shutdown Systems and Safe Shutdown Paths		
3.3	Safe Shutdown Cable Selection and Location		
3.3.1	Criteria/Assumptions		
3.3.1.1	[Cable Selection]		
3.3.1.2	Cables Affecting Multiple Components		
3.3.1.3	[Isolation Devices]		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
3.3.1.4	[Identify "Not Required" Cables]		
3.3.1.5	[Identification of Power Supplies]		
3.3.1.6	[ESFAS Initiation]		
3.3.1.7	[Circuit Coordination]		
3.3.2	Associated Circuit Cables		
3.3.2 [A]	Associated Circuit Cables – Cables Whose Failure May Cause Spurious Actuations		
3.3.2 [B]	Associated Circuit Cables – Common Power Source Cables		
3.3.2 [C]	Associated Circuit Cables – Common Enclosure Cables		
3.3.3	Methodology for Cable Selection and Location		
3.3.3.1	Identify Circuits Required for the Operation of the Safe Shutdown Equipment		
3.3.3.2	Identify Interlocked Circuits and Cables Whose Spurious Operation or Mal-operation Could		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
	Affect Shutdown		
3.3.3.3	Assign Cables to the Safe Shutdown Equipment		
3.3.3.4	Identify Routing of Cables		
3.3.3.5	Identify Location of Raceway and Cables by Fire Area		
3.4	Fire Area assessment and Compliance Assessment		
3.4.1	Criteria/Assumptions		
3.4.1.1	[Number of Postulated Fires]		
3.4.1.2	[Damage to Unprotected Equipment and Cables]		
3.4.1.3	[Assess Impacts to Required Components]		
3.4.1.4	Manual Actions		
3.4.1.5	[Repairs]		
3.4.1.6	[Assess Compliance with Deterministic Criteria]		
3.4.1.7	Consider Additional Equipment		
3.4.1.8	[Consider Instrument Tubing Effects]		
3.4.2	Methodology for Fire		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
	Area Assessment		
3.4.2.1	Identify the Affected Equipment By Fire Area		
3.4.2.2	Determine the Shutdown Paths Least Impacted by a Fire in Each Fire Area		
3.4.2.3	Determine Safe shutdown Equipment Impacts		
3.4.2.4	Develop a Compliance Strategy or Disposition to Mitigate the Effects Due to fire Damage to Each Required Component or Cable		
3.4.2.5	Document the Compliance Strategy or Disposition Determined to Mitigate the Effects Due to Fire Damage to Each Required Component or Cable		
3.5	Circuit Analysis and Evaluation		
3.5.1	Criteria/Assumptions		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
3.5.1.1	Circuit Failure Types and Impact		
3.5.1.2	[Circuit Contacts and Operational Modes]		
3.5.1.3	[Duration of Circuit Failures]		
3.5.1.4	[Cable Failure Configurations]		
3.5.1.5	[A, Circuit Failure Risk Assessment Guidance]		
3.5.1.5	[B, Cable Failure Modes]		
3.5.1.5	[C, Likelihood of Undesired Consequences]		
3.5.2	Types of Circuit Failures		
3.5.2.1	Circuit Failures Due to Open Circuits		
3.5.2.2	Circuit Failures Due to Shorts to Ground [A, General]		
3.5.2.2	Circuit Failures Due to Shorts to Ground [B, Grounded Circuits]		
3.5.2.2	Circuit Failures Due to Shorts to Ground [C, Ungrounded Circuits]		
3.5.2.3	Circuit Failures Due		

NEI 00-01 Section	Section Title	PLANT Alignment Basis	NRC Staff Evaluation
	to Hot Shorts [A, General]		
3.5.2.3	Circuit Failures Due to Hot Shorts [B, Grounded Circuits]		
3.5.2.3	Circuit Failures Due to Hot Shorts [C, Ungrounded Circuits]		
3.5.2.4	Circuit Failures Due to Inadequate Circuit Coordination		
3.5.2.5	Circuit Failures Due to Common Enclosure Concerns		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.2.1.4	Check Valves		
3.2.1.5	Instrument Failures		
3.2.1.6	[Spurious Components]		
3.2.1.7	[Instrument Tubing]		
3.2.2	Methodology for Equipment Selection		
3.2.2.1	Identify the System Flow Path for Each Shutdown Path,		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.2.2.2	Identify the Equipment in Each Safe Shutdown System Flow Path Including Equipment That May Spuriously Operate and Affect System Operation		
3.2.2.3	Develop a Safe Shutdown Equipment List and Assign the Corresponding System and Safe Shutdown Path(s) to Each		
3.2.2.4	Develop a List of Safe Shutdown Equipment and Assign the Corresponding System and Safe Shutdown Path(s) Designation to Each		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.2.2.5	Identify Dependencies Between Equipment, Supporting Equipment, Safe Shutdown Systems and Safe Shutdown Paths		
3.3	Safe Shutdown Cable Selection and Location		
3.3.1	Criteria/Assumptions		
3.3.1.1	[Cable Selection]		
3.3.1.2	Cables Affecting Multiple Components		
3.3.1.3	[Isolation Devices]		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.3.1.4	[Identify "Not Required" Cables]		
3.3.1.5	[Identification of Power Supplies]		
3.3.1.6	[ESFAS Initiation]		
3.3.1.7	[Circuit Coordination]		
3.3.2	Associated Circuit Cables		
3.3.2 [A]	Associated Circuit Cables – Cables Whose Failure May Cause Spurious Actuations		
3.3.2 [B]	Associated Circuit Cables – Common Power Source Cables		
3.3.2 [C]	Associated Circuit Cables – Common Enclosure Cables		
3.3.3	Methodology for Cable Selection and Location		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.3.3.1	Identify Circuits Required for the Operation of the Safe Shutdown Equipment		
3.3.3.2	Identify Interlocked Circuits and Cables Whose Spurious Operation or Mal-operation Could Affect Shutdown		
3.3.3.3	Assign Cables to the Safe Shutdown Equipment		
3.4	Fire Area assessment and Compliance Assessment		
3.4.1	Criteria/Assumptions		
3.4.1.1	[Number of Postulated Fires]		
3.4.1.2	[Damage to Unprotected Equipment and Cables]		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.4.1.3	[Assess Impacts to Required Components]		
3.4.1.4	Manual Actions		
3.4.1.5	[Repairs]		
3.4.1.6	[Assess Compliance with Deterministic Criteria]		
3.4.1.7	Consider Additional Equipment		
3.4.1.8	[Consider Instrument Tubing Effects]		
3.4.2	Methodology for Fire Area Assessment		
3.4.2.1	Identify the Affected Equipment By Fire Area		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.4.2.2	Determine the Shutdown Paths Least Impacted by a Fire in Each Fire Area		
3.4.2.3	Determine Safe shutdown Equipment Impacts		
3.4.2.4	Develop a Compliance Strategy or Disposition to Mitigate the Effects Due to fire Damage to Each Required Component or Cable		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.4.2.5	Document the Compliance Strategy or Disposition Determined to Mitigate the Effects Due to Fire Damage to Each Required Component or Cable		
3.5	Circuit Analysis and Evaluation		
3.5.1	Criteria/Assumptions		
3.5.1.1	Circuit Failure Types and Impact		
3.5.1.2	[Circuit Contacts and Operational Modes]		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**	**Alignment Basis**	**Staff Evaluation**
3.5.1.3	[Duration of Circuit Failures]		
3.5.1.4	[Cable Failure Configurations]		
3.5.1.5	[A, Circuit Failure Risk Assessment Guidance]		
3.5.1.5	[B, Cable Failure Modes]		
3.5.1.5	[C, Likelihood of Undesired Consequences]		
3.5.2	Types of Circuit Failures		
3.5.2.1	Circuit Failures Due to Open Circuits		
3.5.2.2	Circuit Failures Due to Shorts to Ground [A, General]		
3.5.2.2	Circuit Failures Due to Shorts to Ground [B, Grounded Circuits]		
3.5.2.2	Circuit Failures Due to Shorts to Ground [C, Ungrounded Circuits]		

Table 3.2-1, Nuclear Safety Capability Assessment Methods Alignment Matrix			
NEI 00-01 Section	**Section Title**		
3.5.2.3	Circuit Failures Due to Hot Shorts [A, General]		
3.5.2.3	Circuit Failures Due to Hot Shorts [B, Grounded Circuits]		
3.5.2.3	Circuit Failures Due to Hot Shorts [C, Ungrounded Circuits]		

Attachment C, Fire Risk Evaluation Tables

The licensee evaluated the technical adequacy of the portions of its internal events PRA model used to support development of the Fire PRA (FPRA) model by *[describe the quality review process]*. Table 3.4-1, "Internal Events PRA Findings and Observations Resolution," summarizes the NRC staff's review of the licensee's resolution of the internal events PRA F&Os, which demonstrates the technical adequacy.

[Describe the evolution of the plant's Fire PRA, including the following that may apply: areas previously identified by the NRC or industry as (1) not complete, (2) having findings or suggestions, or (3) assigned a Capability Category (CC) I. Also include if findings were dispositioned and if any supporting requirements were evaluated as less than Capability Category II without any specific F&O. It is expected that each Fire PRA will have had a full peer review performed by industry.]

The licensee provided detailed information regarding the correlations and fire models used to support implementation of NFPA 805 at PLANT, as well as a cross reference between major sections of American Society for Testing and Materials (ASTM) guidance document ASTM E 1355-05a, "Standard Guide for Evaluating Predictive Capability of Deterministic Fire Models," and the associated correlations in terms of their applicability and validation. Table 3.4-3, "V&V Basis for Fire Modeling Correlations Used at PLANT," identifies the empirical correlations and models used in the screening tool, the basis for acceptability with respect to verification and validation (V&V), and the staff's evaluation of that basis. Table 3.4-4, "V&V Basis for Fire Model Calculations of Other Models Used at PLANT," identifies the other fire modeling calculations used in the development of the PLANT Fire PRA. For each of these additional methods, the NRC staff reviewed the fire protection program quality assurance process requirements of NFPA 805, Section 2.7.3, for performing V&V, limiting the application of acceptable methods and models to within prescribed boundaries, ensuring that personnel applying acceptable methods are qualified, and performing uncertainty analyses.

While performing its review of the licensee's fire risk evaluations, the NRC staff identified several issues that required the licensee to provide additional information in order to demonstrate that it had adequately evaluated the cumulative change in risk associated with transition to NFPA 805. Table 3.4-5, "Resolution of Fire Risk Assessment Requests for Additional Information," provides a summary of the supplemental information provided by the licensee and the NRC staff's evaluation of the licensee's response.

During the development of the PLANT Fire PRA, the licensee identified the key assumptions and sources of uncertainty that could potentially impact the risk analyses which support its LAR to transition to NFPA 805, and provided an evaluation of the sensitivity of the risk results to these issues. Table 3.4-6, "Uncertainty and Sensitivity Issues," provides a summary of the uncertainty and sensitivity issues identified and the NRC staff's evaluation of the impact on the associated risk analyses.

Attachment C1: Table 3.4-1, Internal Events PRA F&O Resolution

Finding and Observation	Licensee Disposition	Final Status	NRC Staff Disposition
Insert the F&O from the LAR submittal. *Example* F&O DA-C1-01 A value of 1.0 was applied to generic data sources with zero failures, which is not consistent with typically accepted statistical approaches.	*Insert information provided under oath and affirmation by the licensee that describes the disposition of the F&O. This information can be in either the LAR submittal or in subsequent letters submitting RAI responses.*	*i.e., CC-III*	*Describe the review results. Possible dispositions include: the licensee provided sufficient justification for the adequacy of the PRA, the results of the PRA are not sensitive to the issue in the finding, the licensee modified the PRA to address the finding.*

Attachment C2: Table 3.4-2, Fire PRA F&O Resolution

Finding and Observation	Licensee Disposition	Final Status	NRC Staff Disposition
Insert the F&O from the LAR submittal. Example F&O PP-B2-01 Documentation of the characteristics of non-rated barriers is not adequate.	*Insert information provided under oath and affirmation by the licensee that describes the disposition of the F&O. This information can be in either the LAR submittal or in subsequent letters submitting RAI responses.*	*i.e. CC-III*	*Describe the review results. Possible dispositions include: the licensee provided sufficient justification for the adequacy of the PRA, the results of the PRA are not sensitive to the issue in the finding, the licensee modified the PRA to address the finding.*

** Not meeting a specific supporting requirement of the PRA can be acceptable if it is deemed to have minimal impact on the overall model as it is being utilized for the current application. The NRC staff has concluded that this is the case for the PLANT NFPA 805 LAR and its associated Fire PRA model.

Attachment C3: Table 3.4-3, V&V Basis for Fire Modeling Correlations Used at PLANT

Correlation	Application at PLANT	V&V Basis	NRC Staff Evaluation of Acceptability
i.e. Flame Height	*Describe the application of the correlation*	*List associated references*	*Provide an evaluation of the correlation as it is applied at the plant. Describe any limitations or constraints to the application of the correlation.*

References for Table 3.4-3

1. NUREG-1824, “Verification & Validation of Selected Fire Models for Nuclear Power Plant Applications”, U.S. Nuclear Regulatory Commission, Washington, DC, May, 2007.

2. NUREG-1805, “Fire Dynamics Tools (FDT^{s}) Quantitative Fire Hazard Analysis Methods for the U. S. Nuclear Regulatory Commission Fire Protection Inspection Program,” U.S. Nuclear Regulatory Commission, Washington, DC, December 2004.

3.

Attachment C4, Table 3.4-4, V&V Basis for Fire Model Correlation for Other Models Used at PLANT

Calculation	Application at PLANT	V&V Basis	NRC Staff Evaluation of Acceptability
i.e. Hot Gas Layer Calculation *(calc. reference #)*	*Describe the application of the calculation at the plant.*	*List associated references*	*Provide an evaluation of the calculation as it is applied at the plant. Describe any limitations or constraints to the application of the calculation.*

References for Table 3.4-4

1. NUREG-1824, "Verification & Validation of Selected Fire Models for Nuclear Power Plant Applications", U.S. Nuclear Regulatory Commission, Washington, DC, May, 2007.

2. NUREG-1805, "Fire Dynamics Tools (FDT^{s}) Quantitative Fire Hazard Analysis Methods for the U. S. Nuclear Regulatory Commission Fire Protection Inspection Program," U.S. Nuclear Regulatory Commission, Washington, DC, December 2004.

3. NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities," U.S. Nuclear Regulatory Commission, Washington, DC, September 2005.

Attachment C5: Table 3.4-5, Resolution of Fire Risk Assessment Requests for Additional Information

RAI	Subject	NRC Staff Evaluation of RAI Response and Basis for Acceptability	Subject Area
X.X	*Describe the technical question at issue in the RAI.*	*Summarize the technical basis for acceptability.*	*Insert RAI category*

Attachment C6: Table 3.4-6, Uncertainty and Sensitivity Issues

Issue Description	Evaluation	NRC Staff Conclusion
Briefly describe a particular sensitivity or uncertainty issue.	*Provide an evaluation of the sensitivity or uncertainty issue. Include an evaluation of the effect on the model conclusions.*	*Insert a summary statement regarding the acceptability of the sensitivity or uncertainty issue. The following is sample language:* Since the bounding sensitivity shows no significant impact on the change in risk results, this assumption is acceptable for this application.

References for Table 3.4-6

1.

Attachment D: Nuclear Safety Capability Assessment Results by Fire Area

Attachment D is broken down into those PLANT fire areas that were analyzed using the deterministic approach in accordance with NFPA 805, Section 4.2.3, and those using the performance-based approach in accordance with NFPA 805, Section 4.2.4.

Each fire area includes a discussion of how the licensee met the NFPA 805 requirement to evaluate the potential fire suppression effects on the ability to meet the nuclear safety performance criteria.

Each fire area also contains a section that addresses those NRC approved deviations from the existing deterministic fire protection licensing basis that the licensee desires to incorporate into the RI/PB FPP, as allowed by NFPA 805, Section 2.2.7. This discussion for each applicable fire area includes a description of the previously approved deviation from the deterministic requirements, the basis for and continuing validity of the deviation, and the NRC staff's evaluation of that deviation.

Attachment D also provides an evaluation of the credited recovery actions for each applicable fire area. The NRC staff documented the credited recovery actions and provided the additional risk of their use as evaluated by the licensee.

In addition, as documented in the applicable fire areas, the ERFBS used at PLANT have all been analyzed using the performance-based approach in accordance with NFPA 805, Section 4.2.4. Accordingly, each fire area utilizing ERFBS includes a discussion of the VFDR analysis used to evaluate the acceptability of this feature, as well as the staff's evaluation of that conclusion.

For all fire areas where the licensee utilized the performance-based approach to meet the nuclear safety performance criteria, each VFDR and the associated disposition has been listed, as well as the NRC staff's evaluation of each.

As a part of the nuclear safety capability assessment, the licensee evaluated fire detection and suppression systems on a fire area basis. Accordingly, the evaluation of each fire area includes a table that documents the licensee's review of these fire detection and suppression systems, as well as the NRC staff's evaluation of the review and its results.

Finally, each fire area includes a summary assessment documenting the NRC staff's conclusion regarding the ability to meet the NFPA 805 requirements and the associated nuclear safety performance criteria.

Attachment D1: Deterministic Compliance with NFPA 805 Section 4.2.3

For each fire area where the licensee has selected the deterministic approach to demonstrate compliance, the staff verified that the deterministic requirements of NFPA 805 Section 4.2.3 are met without the use of recovery actions. Fire areas that meet the deterministic requirements of NFPA 805 are "deemed to satisfy" the nuclear safety performance criteria as stated in NFPA 805 Section 4.1.

The licensee evaluated suppression and detection systems using a process that looked at several key aspects of the fire protection program to determine if a given system is required (i.e., deterministically in support of compliance with NFPA 805 Chapter 4, in support of a previous NRC approved deviation, in support of a licensee-developed engineering equivalency evaluation, or as a result of the performance-based evaluations).

Accordingly, each of the fire areas listed below include a section discussing those fire suppression and fire detection systems the licensee has determined to be required to meet the nuclear safety performance criteria.

Fire Area X-XX-X, FIRE AREA TITLE - Analysis Area X

The licensee stated that deterministic compliance has been met in accordance with *[adjust reference to regulation, as appropriate]* NFPA 805 Section 4.2.3.2, which requires that one success path of required cables and equipment shall be located in a separate area having boundaries containing fire barriers with a minimum fire resistance rating of 3 hours. The licensee identified the systems, structures and components (SSCs) necessary to meet the nuclear safety performance criteria (NSPC) in this fire area.

Evaluation of Fire Suppression Effects on Nuclear Safety Performance Criteria for Fire Area XX-XX

Describe the mitigation of damage caused by water from suppression activities. The following is sample language.

The licensee stated in *[insert reference to docketed submittal material]* that damage to plant areas and equipment from the accumulation of water discharged from hose lines is minimized by the provision of a floor drainage systems. Floor water surcharge is estimated to be insignificant since excess water can overflow to adjacent areas. Runoff is directed to the floor drainage transfer tank or storm drainage system, as detailed in FSAR Section 9.3.3. Therefore, fire suppression activities will not adversely affect achievement of the NSPC.

Based on the information provided by the licensee in the NFPA 805 LAR, as supplemented, the staff finds the licensee's evaluation of fire suppression effects on NSPC acceptable because the results of the licensee's analysis indicate that fire suppression activities will not adversely affect achievement of the NSPC.

Based on the information provided in the LAR, as supplemented, the licensee did not identify any variances from the deterministic requirements (VFDRs), nor did it credit any previously approved deviations from the deterministic guidance *[or exemptions from deterministic requirements]* for this area.

OR

Based on the information provided in the LAR, the licensee did not identify any variances from the deterministic requirements (VFDRs). However, the licensee credits *[insert number]* previously approved exemptions [*OR* deviations] from the existing fire protection requirements. The licensee utilized the process described in *[insert reference to docketed submittal material describing the transition process of previous approvals]* which requires a determination of the basis of acceptability and a determination that the basis of the acceptability was still valid.

Deviation	Basis and Continuing Validity	Evaluation
Describe the VFDR.	The deviation was approved based on *[insert the basis for approval of the deviation and the basis for the continued validity of the deviation]*.	*Provide an evaluation of the licensee's basis for continued validity. Below are two examples.* This VFDR was re-evaluated for consideration in the RI/PB FPP. See discussion in Section 3.5.1 of this SE for details. *Or* Based on the previous staff approval of this variance and the statement by the licensee that the basis remains valid, the staff finds this variance acceptable.

The licensee performed an evaluation of the fire detection and suppression systems in this area. The results of the evaluation were documented in LAR Table 4-3 "Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features." The applicable portions of Table 4-3 are included below.

Fire Area	Fire Zone	Zone Description	Auto Suppression Provided?	Suppression Required System? (S, D, E, R, C)	Detection Provided?	Detection Required System? (S, D, E, R, C)
			Yes/No		**Yes/No**	

Legend:

S - Abbreviation for Separation:	Systems required for Chapter 4 Separation Criteria
D - Abbreviation for Deviation:	Systems required for NRC approved Exemptions/Deviations
E - Abbreviation for EEEE:	Systems required for acceptability of existing compliance strategies in Engineering Equivalency Evaluations
R - Abbreviation for Risk:	Systems determined to be of 'higher significance' by NFPA 805 Expert Panel
C - Change Evaluation:	Systems required to maintain adequate balance of Defense-in-Depth in a Change Evaluation

If needed, describe any pertinent RAI responses that address a technical issue raised by the reviewer. Include a reference to the RAI response. Briefly describe the technical issue in the RAI, the licensee response, and the reviewer's evaluation of the response.

Fire Area XX-XX Conclusion

Based on:

1. The licensee's documented compliance with *[adjust reference to regulation as appropriate]* NFPA 805 Section 4.2.3.2, and the licensee's assertion that the success path will be free of fire damage without reliance on recovery actions.

2. The assessment of the impact of suppression systems on the ability to meet the nuclear safety performance criteria.

3. The licensee's determination of the automatic suppression and detection systems required to meet the nuclear safety performance criteria.

Fire Area XX-XX meets the deterministic requirements of *[adjust reference to regulation as appropriate]* NFPA 805 Section 4.2.3.2.

Attachment D2, Performance-Based Compliance with NFPA 805 Section 4.2.4

For each fire area where the licensee has selected fire risk evaluation as the PB approach, the NRC staff verified that the change in risk is appropriately defined, the magnitude is acceptable, and DID and sufficient SM are maintained. The NRC staff also verified that the additional risk of RAs is acceptable.

[If the licensee used fire modeling in accordance with NFPA 805, Section 4.2.4.1, describe the attributes of the evaluation as reviewed by NRC staff]

The licensee included the assessment of DID and SM in the [*insert applicable document*] for each of the areas addressed using the performance-based approach. Each fire risk evaluation assessed most aspects of DID, including: Passive fire protection features (fire barriers, through penetration fire stops, penetration seals, radiant energy shields. Etc.), active fire protection features (doors and dampers) and programmatic controls (combustible controls, hot work, design – flame spread of surfaces, electrical design, etc.), including manual suppression using fire extinguishers and hoses.

The licensee addressed the remaining DID attributes (*list examples*) separately. *[Describe plant-specific DID and SM treatments in PB analyses. For example: The licensee evaluated suppression and detection using a process that looked at several key aspects of the fire protection program to determine if a given system is required or not (deterministically in support of compliance to NFPA 805 Chapter 4, in support of a previous staff approved deviation, in support of a licensee-developed engineering equivalency evaluation, or as a result of the performance-based evaluations).]*

[If the licensee used fire modeling in accordance with NFPA 805, Section 4.2.4.1, describe the process by which the licensee evaluated DID and SM for a fire area].

Each of the fire areas below include a section discussing those fire suppression and fire detection systems the licensee has determined to be required to meet the nuclear safety performance criteria.

Fire Area XX-XXX, FIRE AREA TITLE

The licensee analyzed this fire area using the fire risk evaluation approach in accordance with NFPA 805, Section 4.2.4.2, but also used deterministic simplifying assumptions in order to credit those portions of the facility design that meet the deterministic requirements of NFPA 805, Section 4.2.3. The licensee identified the SSCs necessary to meet the nuclear safety performance criteria(NSPC) in this fire area.

Evaluation of Fire Suppression Effects on Nuclear Safety Performance Criteria for Fire Area 12-A-BAL

The licensee stated in *[insert reference to docketed submittal material]* that plant equipment subject to water damage is *[describe the protection and/or mitigating design features for the subject plant equipment]*. Damage to plant areas and equipment from the accumulation of water discharge from sprinkler system and hose lines is minimized by *[describe the drainage system for the area]*. Floor water surcharge is estimated to be insignificant since excess water can overflow to adjacent areas. Runoff is directed to the floor drain system. Therefore, fire suppression activities will not adversely affect achievement of the NSPC.

Based on the information provided by the licensee in the NFPA 805 LAR, as supplemented, the staff finds the licensee's evaluation of fire suppression effects on NSPC acceptable because the results of the licensee's analysis indicate that fire suppression activities will not adversely affect achievement of the NSPC.

Fire Area XX-XXX Deviations

The licensee credited *[insert number]* previously approved exemptions [OR deviations] from the existing fire protection requirements. The licensee utilized the process described in *[insert reference to docketed submittal material describing the transition process of previous approvals]* which requires a description of the basis of acceptability and a determination that the basis of the acceptability was still valid.

Deviation	Basis and Continuing Validity	Evaluation
Describe the VFDR.	The deviation was approved based on *[insert the basis for approval of the deviation and the basis for the continued validity of the deviation]*.	Based on the previous staff approval of this deviation and the statement by the licensee that the basis remains valid, the NRC staff finds this VFDR acceptable.

Variances from Deterministic Requirements (VFDRs)

PLANT's Open Item #	VFDR Description	Component	Disposition	NRC Staff Evaluation
XXX	*Describe the VFDR.*	*List the affected components and any associated cables*	Example language: *Describe basis provided by the licensee for why the VFDR is not safety significant (i.e. Not within ZOI of a risk significant ignition source)* *and/or* *Describe any modifications to which the licensee committed.*	Based on *[insert technical evaluation]*, the staff finds this acceptable.

The fire risk evaluation for this fire area determined that the additional risk incorporated because of this VFDR is X.XXE-X (ΔCDF) and X.XXE-X (ΔLERF).

Recovery Actions (RAs)

The licensee did not identify any recovery actions required for this fire area.

OR

Component ID	Component Name	Description of Action
X-XXX	Example: Valve B123	Describe the action and the intended result of the action. For example: D-energize channel 123 at MCC panel A, Cabinet 2 in fire zone ABCD to fail the valves closed.

Fire Detection & Suppression Systems Required to Meet the Nuclear Safety Performance Criteria

The licensee performed an evaluation of the fire detection and suppression systems in this fire area. The results of the evaluation were documented in *[insert reference to docketed submittal material]*. The applicable portions of the information submitted by the licensee are included below.

Fire Area	Fire Zone	Zone Description	Auto Suppression Provided?	Suppression Required System? (S,D,E,EC,R,C)	Detection Provided? (I,T)	Detection Required System? (S,D,E,EC,R,C)
XX-XX	XX-XXX	Example: Switchgear room Elev. 5 ft.	Yes/No		Y/N	

Legend:

S - Abbreviation for Separation: Systems required for Chapter 4 Separation Criteria
D - Abbreviation for Deviation: Systems required for NRC approved Exemptions/Deviations
E - Abbreviation for EEEE: Systems required for acceptability of existing compliance strategies in Engineering Equivalency Evaluations (also document the engineering change [EC](s), *[and for detection note I &/or T as appropriate])*
R - Abbreviation for Risk: Systems determined to be of 'higher significance' by NFPA 805 Expert Panel
C - Change Evaluation: Systems required to maintain adequate balance of Defense-in-Depth in Change Evaluation
I – Ionization
T – Thermal

If needed, describe any pertinent RAI responses that address a technical issue raised by the reviewer. Include a reference to the RAI response. Briefly describe the technical issue in the RAI, the licensee response, and the reviewer's evaluation of the response.

Conclusion for Fire Area XX-XX

The licensee utilized the fire risk evaluation performance-based approach to demonstrate the ability to meet the NFPA 805 NSPC for this fire area. To apply this approach, the licensee used a fire risk evaluation in accordance with NFPA 805 Section 4.2.4.2, in conjunction with deterministic methods for simplifying assumptions.

Based on the information provided in the LAR, as supplemented:

- *[Insert Number]* approved deviations from the pre-transition requirements were evaluated and found to be valid and applicable under the NFPA 805 RI/PB FPP.
- *[Insert Number]* VFDRs were identified, evaluated through the performance of a fire risk evaluation, and found to meet the required risk acceptance criteria, as well as the requirements for defense-in-depth and safety margins (see Section 3.4 of this safety evaluation for a detailed discussion of the NRC staff's review of the fire risk evaluation method used at PLANT).
- *[Insert Number]* recovery actions were identified, evaluated by including the associated unprotected cables in the fire PRA, and included in the fire area core damage frequency and large early release frequency. [*Describe the analysis method. For example:* The licensee utilized the fire risk for the fire area as a surrogate for the delta risk evaluations required by NFPA 805 Section 4.2.4 for this fire area.] The delta core damage frequency (X.XX E-X) and delta large early release frequency (X.XX E-X) for this fire area meet the requirements of RG 1.174 for a plant with total risk numbers of X.XX E-X (CDF) and X.XX E-X (LERF).
- Fire Protection SSCs were evaluated in accordance with NFPA 805, Chapter 4, to determine which, if any, were required to meet the NSPC. This evaluation included:

  — On a fire zone *[or area]* basis, the fire protection detection and suppression systems required to meet the NSPC were documented.

  — Fire Area boundaries were defined using 3-hour rated walls, ceilings and floors, including fire barriers, fire barrier penetrations and through penetration fire stops. *[Note any associated use of EEEEs for the fire area]*

  — The fire area was evaluated using a quantitative fire risk evaluation that demonstrated the ability to meet acceptance criteria for risk, defense-in-depth and safety margins.

Based on the information provided in the LAR, as supplemented, the NRC staff finds that Fire Area XX-XX meets the nuclear safety goals, objectives and performance criteria of NFPA 805.

References for Attachment D

Attachment E: Radioactive Release Table

In order to assess whether the PLANT fire protection program to be implemented under NFPA 805 meets the radioactive release performance criteria, the licensee *[describe the licensee's process (i.e., expert panel review, screening of fire pre-plans)]*.

The licensee's review determined that existing engineering controls, such as curbs and forced air ventilation, were adequate to meet the NFPA 805 radioactive release requirements. *[Note if any new or modified engineering controls were necessary to meet the radioactive release requirements.]* *[If applicable:]* In addition, the licensee updated each of the fire pre-plans addressing fire areas where radioactive materials may be present to include provisions for containment and monitoring of smoke and fire suppression agent runoff should the effectiveness of the installed engineering controls be challenged or impacted by fire suppression activities.

This attachment contains Table 3.6-1, "PLANT Fire Areas and Their Compliance with the NFPA 805 Radioactive Release Performance Criteria," which summarizes, for each fire pre-plan, (1) the fire areas included in the pre-plan, (2) the engineered controls used to minimize radioactive releases generated from the combustion of radioactive materials or from fire suppression activities, and (3) the NRC staff evaluation of the adequacy of these engineered controls.

Table 3.6-1: PLANT Fire Areas and Their Compliance with the NFPA 805 Radioactive Release Performance Criteria

Fire Pre-Plan	Fire Area(s)	Screened Out	Engineered Controls		NRC Staff Evaluation
			Suppression Water	Combustion Products	
XXX-XX-XXX-XX	X-X	Y/N	[*Describe the engineering controls for during plant operation and for NPO.]*	[*Describe the engineering controls for during plant operation and for NPO.]*	[Provide an evaluation of the engineering controls.]