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Transition Process Pilot Report—NEI 04-02 Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)

Technical Report

Transition Process Pilot Report—NEI 04-02 Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)

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Final Report, July 2004

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PRODUCT DESCRIPTION

Nuclear Energy Institute (NEI) document 04-02, *Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)*, is under development to provide implementing guidance for a new fire protection licensing basis based upon National Fire Protection Association (NFPA) 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants*. This report documents two pilot projects that tested this guidance.

Results & Findings

Pilot projects at McGuire Nuclear Station and the Farley Nuclear Plant determined that the draft Implementing Guidance provides reasonable instructions to a transitioning licensee. The pilot projects demonstrated that the overall process will work and may indeed be beneficial to licensees that choose to adopt a new risk informed, performance-based fire protection licensing basis. Based upon the insights gained during the pilot project, it was estimated that between 1200 and 3800 hours would be required to support a transition to a new licensing basis, excluding effort required to resolve generic industry issues such as circuit failures and manual operator actions and issues outside of the current licensing basis. Using an hourly cost of $100 per hour for technical and management labor, this time estimate equates to a cost of approximately $120,000 to $380,000 to transition the licensing basis.

Challenges & Objectives

The implementing guidance that grew out of these pilot projects is intended to serve two primary purposes:

- Provide direction and clarification for adopting NFPA 805 as an acceptable approach to fire protection, consistent with 10 CFR 50.48 (c)
- Provide additional supplemental technical guidance and methods for using NFPA 805 and its appendices to demonstrate compliance with fire protection requirements.

Applications, Values & Use

The scope of the implementing guidance includes:

- The regulatory framework for adopting NFPA 805 as the basis for compliance to fire protection regulations
- The risk-informed, performance-based fire protection program process and available options
- Guidance on implementing the transition to a new fire protection licensing basis
- Guidance for using NFPA 805 analysis tools within a current licensing basis
- Guidance for program maintenance and configuration control processes
- Technical guidance and acceptable methods for conducting risk-informed, performance-based analyses

This comprehensive coverage is directly relevant to personnel at any plant contemplating or undertaking a transition to the new fire protection licensing basis.

EPRI Perspective

Overall, the Implementing Guide was determined to be effective in transitioning to a new fire protection licensing basis. A number of areas of improvement were identified, and comments were generated to improve the effectiveness of the guide. As long as the NRC continues to support and endorse this concept, NEI 04-02 should provide the guidance necessary to guide the transitioning licensee.

Approach

The project team conducted two pilot studies to "test drive" the methods provided by the NEI for transitioning a fire protection program to a new licensing basis. The main pilot effort conducted at McGuire Nuclear Station in July 2003, focused on transition of a plant to a new fire protection licensing basis under 10 CFR 50.48(c). Duke Power staff, NEI, NRC staff, and members of the NEI 04-02 development team conducted this effort. The guidance in NEI 04-02 was the primary section pilot tested at McGuire Nuclear Station, but other sections of NEI 04-02 were also piloted. In the second effort, the NEI 04-02 Implementing Guide team, the NRC, and plant staff at the Farley Nuclear Plant conducted a table-top exercise of the NEI 04-02 Plant Change Evaluation process in May 2003. While this report focuses on the transition pilot conducted at McGuire Nuclear Station, it also provides a summary of the change evaluation table-top project.

Keywords

Fire protection
Risk-informed, performance-based
10 CFR 50 Appendix R
10 CFR 50.48(c)

ABSTRACT

Nuclear Energy Institute (NEI) document 04-02, *Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)*, is under development to provide implementing guidance for a new fire protection licensing basis based upon National Fire Protection Association (NFPA) 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants*. The Implementing Guidance is intended to serve two primary purposes:

- Provide direction and clarification for adopting NFPA 805, and
- Provide technical guidance and methods for using NFPA 805

Two pilot projects were conducted to test the methods provided for the change evaluation process and transitioning a fire protection program to a new licensing basis. A change evaluation process pilot project was conducted in April and May of 2003 at Farley Nuclear Plant. Individuals from the NRC, NEI, Southern Company, and the Implementing Guidance team were involved in the pilot project. The guidance in NEI 04-02 Section 8.3 was used during the pilot. Insights gained during the table-top project were incorporated into NEI 04-02 Draft Revision D, which was sent to the Nuclear Regulatory Commission (NRC) for review and comment by letter dated May 15, 2003.

In July and August 2003, the second NEI 04-02 pilot project was conducted at McGuire Nuclear Station. The pilot focused on the transition of a plant from a traditional fire protection licensing basis to a new licensing basis under the proposed new fire protection rulemaking. The guidance in Section 6.0 of NEI 04-02 was the primary section that was piloted at McGuire. Individuals from the NRC, NEI, Duke Power, and the Implementing Guidance team conducted the table-top project. The transition pilot effort, which is the primary focus of this report, consisted of efforts that ranged from essential completion of transition activities (e.g., transition of Fundamental Fire Protection Program and Design Elements from Chapter 3 of NFPA 805) to best estimates of planned activities that would require more extensive analytical work (e.g., Non-Power Operational Modes). Included in the pilot were technical reviews, as well as preparation of licensee documentation that would be submitted as part of a transition to a new licensing basis.

The pilot projects determined that the draft Implementing Guidance provides reasonable guidance to a transitioning licensee and may indeed be beneficial to a licensee planning to transition. No technical "showstoppers" were identified that would make the transition unreasonable. Insights were gained that will result in changes to the Implementing Guidance and that will help licensees understand the level of effort involved in a transition. Based upon the insights gained during the pilot project, it was estimated that between 1200 and 3800 hours would be required to support a transition to a new licensing basis, excluding effort required to resolve generic industry issues (e.g., circuit failures, manual operator actions) and issues outside of the current licensing basis.

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BACKGROUND

1.1 NEI 04-02 – Implementing Guide Background

Nuclear Energy Institute (NEI) document 04-02, *Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)*, is under development to provide implementing guidance for a new fire protection licensing basis based upon National Fire Protection Association (NFPA) 805. The implementing guidance is intended to serve two primary purposes:

- Provide direction and clarification for adopting NFPA 805 as an acceptable approach to fire protection, consistent with 10 CFR 50.48 (c), and
- Provide additional supplemental technical guidance and methods for using NFPA 805 and its appendices to demonstrate compliance with fire protection requirements.

NFPA 805 establishes a comprehensive set of requirements for fire protection programs at nuclear power plants. It incorporates both deterministic and risk-informed, performance-based concepts. The deterministic aspects of NFPA 805 are comparable to traditional requirements, and thus need little additional guidance. Although there is a significant amount of detail in NFPA 805 and its appendices (not considered by NFPA to be part of the standard), clarification and additional guidance for select issues will help ensure consistency and effective utilization of the standard. Accordingly, the implementing guidance focuses attention on the risk-informed, performance-based fire protection goals, objectives, and performance criteria contained in NFPA 805 and the risk-informed, performance-based tools considered acceptable for demonstrating compliance.

The scope of the implementing guidance includes:

- Discussion of the regulatory framework for adopting NFPA 805 as the basis for compliance to fire protection regulations (Chapter 4);
- Overview of the risk-informed, performance-based fire protection program process and available options (Chapter 5);
- Implementing guidance for transitioning to a new fire protection licensing basis (Chapter 6);
- Guidance for using NFPA 805 analysis tools within a current licensing basis (Chapter 7);
- Guidance for program maintenance and configuration control processes (Chapter 8); and
- Technical guidance and acceptable methods for conducting risk-informed, performance-based analyses (Appendices)

This pilot study was conducted to "test drive" the methods provided for transitioning a fire protection program to a new licensing basis. The guidance in Section 6.0 of NEI 04-02 was the primary section that was piloted at McGuire Nuclear Station. However, other sections of NEI 04-02 were also piloted due to the document structure and cross references within the document.

1.2 Overview of Transition Process

The process for transition to a new fire protection licensing basis is defined in Section 6.1.1 of Draft D of NEI 04-02 and formed the basis for the pilot evaluation. The following key transition steps are defined in NEI 04-02 and are reflected in the figure below (Figure 6-1 of NEI 04-02):

- Provide confirmation that the transitioning fire protection program, to the extent that the NRC has not previously approved its fundamental program attributes, meets the fundamental program elements and minimum design elements of Chapter 3 of NFPA 805, or has acceptable documented bases for exceptions.
- Provide confirmation that the transitioning fire protection program meets the nuclear safety deterministic criteria, or has acceptable documented bases for exceptions.
- Identify acceptable approaches and perform analyses to address fires originating in non-power operational modes and fire protection to effectively minimize radioactive release.
- Perform engineering analyses to address areas where the requirements of NFPA 805 are not met and are not previously approved in the licensee's current licensing basis.
- Address risk-informed, performance-based attributes (i.e., safety margin, defense-in-depth) where the requirements of NFPA 805 are not met and are not previously approved in the licensee's current licensing basis. This may include performance of a change evaluation for nuclear safety aspects of the transition.
- Verify/establish a monitoring program to ensure the availability and reliability of fire protection systems and features and to assess the fire protection program.
- Confirm/establish adequate quality, documentation and configuration control to transition to a new licensing basis

A simplified flowchart is provided below:

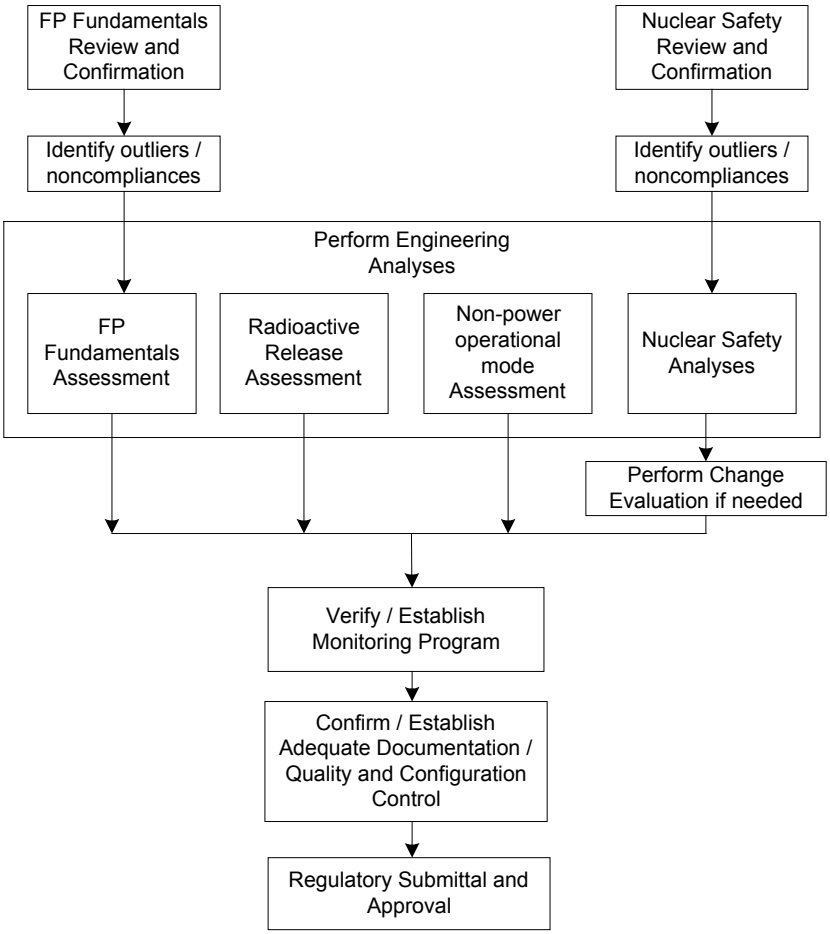

Figure 1-1
Transition Process (Simplified)
[Ref. Figure 6-1 of Draft D of NEI 04-02]

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PURPOSE AND SCOPE

The purpose of the pilot and table-top projects was to "test drive" the methods provided for the change evaluation process and transitioning a fire protection program to a new licensing basis. The pilot was intended to provide meaningful feedback to the development of the NEI 04-02 Implementing Guidance and rulemaking process. Figure 2-1 outlines the topics addressed during the transition pilot project at McGuire Nuclear Station and change evaluation table-top project at Farley Nuclear Plant and provides a roadmap to the content of this report.

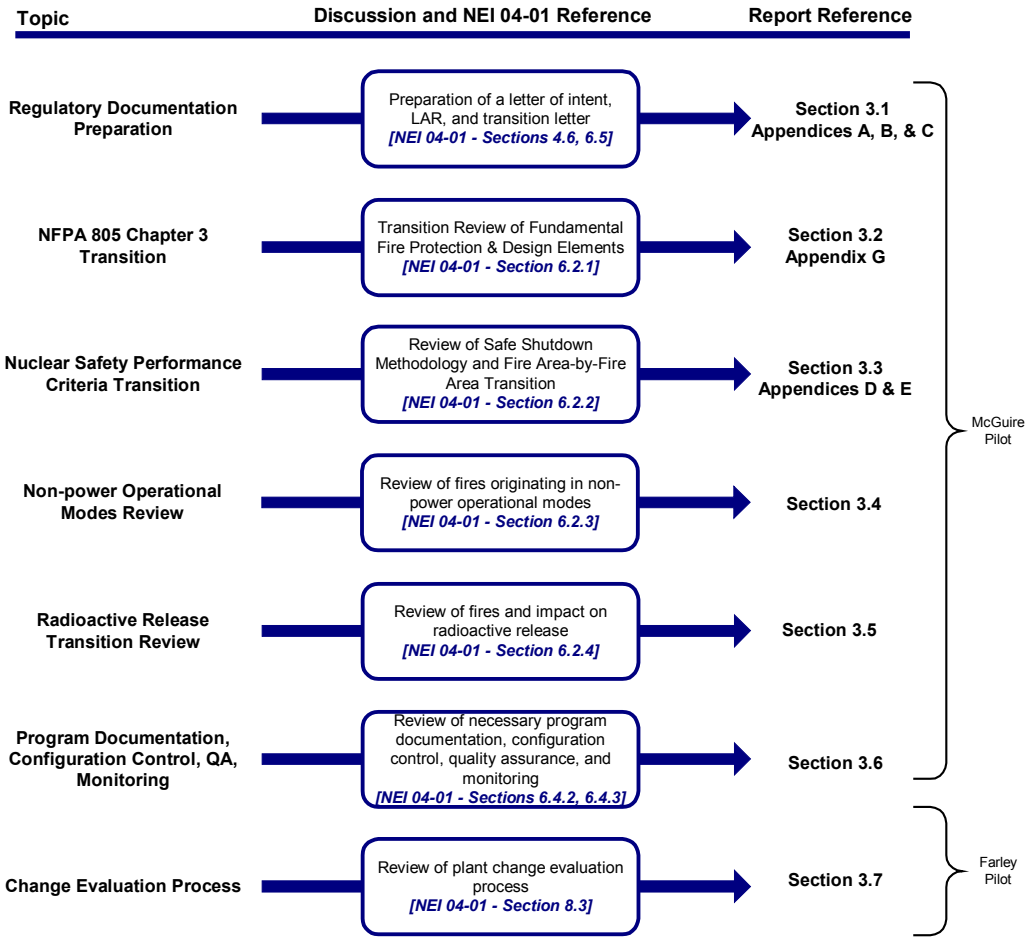

Figure 2-1
NEI 04-02 Pilot and Table-Top Projects – Report Roadmap

2.1 Licensing Basis Transition Pilot

A pilot effort was conducted at McGuire Nuclear Station in July 2003 to exercise the NEI 04-02 Implementing Guidance Draft D. The pilot project was focused on transition of a plant to a new fire protection licensing basis under 10 CFR 50.48(c). Duke Power staff, NEI, NRC staff, and members of the NEI 04-02 development team conducted the transition pilot effort. These individuals were divided into teams that focused on the following subject areas:

- Preparation of regulatory documentation, including a "letter of intent", a license amendment request, and a transition letter with details on the methods and results of the transition assessments. This effort utilized guidance in Sections 4.6 and 6.5 of Draft D of NEI 04-02 Implementing Guidance. Refer to Section 3.1 of this report for additional discussion and to Appendices A and B for sample regulatory documents prepared as part of the pilot project.
- Draft representative sections of the Fundamental Fire Protection Program and Design Element transition required in Section 6.2.1 of the Draft D of NEI 04-02 Implementing Guidance (Appendix B-1). Refer to Section 3.2 of this report for additional discussion and to Appendix G for tables completed during the pilot project.
- Perform reviews of nuclear safety performance criteria in Section 6.2.2 of the Draft D of NEI 04-02 Implementing Guidance in order to gain insight into the level of effort required to perform a complete transition. Refer to Section 3.3 of this report for additional discussion and to Appendices C and D for tables completed during the pilot project.
- Perform reviews and assessment of fires originating in non-power operational modes, using the guidance in Section 6.2.3 of the Draft D of NEI 04-02 Implementing Guidance in order to gain insight into the level of effort required for a complete transition. Refer to Section 3.4 of this report for additional discussion.
- Perform reviews and assessment of fire and the impact on radioactive release during fire fighting activities, using the guidance in Section 6.2.4 of the Draft D of NEI 04-02 Implementing Guidance in order to gain insight into the level of effort required for a complete transition. Refer to Section 3.5 of this report for additional discussion.
- Review aspects of program documentation, configuration control, quality assurance, and monitoring to gain insight into changes that would need to be made for a plant undergoing transition. Refer to Section 3.5 of this report for additional discussion.

Comments and proposed changes to Draft D of NEI 04-02 were identified during the pilot project. These comments will be considered during the next proposed revision of NEI 04-02. Appendix F to the report includes the comments developed during the pilot project.

2.2 Change Evaluation Process Table-Top Project

A table-top exercise of the NEI 04-02 Plant Change Evaluation process (Section 8.3 of NEI 04-02) was conducted with the NEI 04-02 Implementing Guide team, the NRC, and plant staff at the Farley Nuclear Plant in May 2003. The Farley Plant Change Evaluation pilot concluded that the change evaluation process was generally workable, and with minor modifications, could successfully be implemented as part of a licensee transition. Changes identified during the

Farley Nuclear Plant table-top project were incorporated into Draft Revision D of NEI 04-02 which was sent to the NRC for review and comment by letter dated May 15, 2003 [ADAMS Accession Nos. ML031350530, ML031350544, ML0313505610, ML031350567, ML031350574, ML031350580, ML031350588, ML031350592, and ML031350596]. While this report focuses on the transition pilot conducted at McGuire Nuclear Station, Section 3.7 provides a summary of the change evaluation table-top project.

3
METHODOLOGY AND RESULTS

3.1 Regulatory Documentation Preparation

In accordance with Section 4 and Section 6 of NEI 04-02 Implementing Guidance Draft D, regulatory documentation was prepared to support a transition to a new risk-informed, performance-based fire protection licensing basis. Three templates were developed for the documents that would be submitted to the NRC in support of McGuire's request to transition its fire protection licensing basis to be the risk-informed, performance-based alternative based on NFPA 805.

- "Letter of intent" which would inform the NRC of McGuire's initiation of actions to transition its licensing basis, provide a preliminary schedule for the transition, and trigger NRC enforcement discretion for any non-compliances found as a result of conducting the transition review process;
- License Amendment Request (LAR) which would identify all of the technical specifications, orders, license conditions and exemptions that would be required to either be amended or revoked and would describe the process used by McGuire to determine that it had found all of the items which needed to be addressed; and
- Transition Report Letter that described the transition process and how its results demonstrated compliance with the new requirements based on NFPA 805.

3.1.1 Letter of Intent

During the pilot project, the concept of a "letter of intent" was discussed. A "letter of intent" would be the method by which a licensee would inform the NRC of its intent to transition to a new licensing basis. The "letter of intent" would include the following key information:

- Plant(s) intended to transition to a new licensing basis.
- When the transition would begin and estimated duration of the transition.
- Outline of activities needed to support the transition and milestone dates.
- Enforcement discretion discussion (unless the NRC issues an Enforcement Guidance Memorandum (EGM))

Based upon the discussions at the pilot project at McGuire, changes will be proposed to the NEI 04-02 Implementing Guidance to reflect the "letter of intent" concept and the expected content of the letter.

A sample "letter of intent" was developed as part of the pilot project and is provided as Appendix A to this report.

3.1.2 Transition Documentation

3.1.2.1 License Amendment Request

A sample license amendment request (LAR) was developed as part of the pilot project. The LAR, which is developed in accordance with 10 CFR 50.90, includes the following key components:

- Technical Specifications to be amended (including changes to the bases) and the process used to make this determination
- Replacement of the impacted fire protection license conditions with a new license condition authorizing the use of NFPA 805
- Identification of unnecessary or superseded orders and exemptions that are required to be revoked and the process used to make this determination.
- Discussion that the Updated Final Safety Analysis Report (UFSAR) will require change and that the changes will be made in accordance with 10 CFR 50.71(e).
- Whether modifications are necessary to support the new licensing basis and a brief description of the modifications.
- An updated transition schedule.
- Determination that changes will not result in an undue risk to the health and safety of the public.

A sample LAR is included as Appendix B to this report.

3.1.2.2 Transition Report Letter

Section 4.6 of the Draft D of NEI 04-02 Implementing Guidance was used as guidance in the development of a draft transition report letter. Some sections of the transition letter were essentially completed during the pilot project, while other areas were outlined (where the content would depend on plant specific information). This process helps to provide a template and some degree of standardization and expectations for a transitioning licensee.

The content of a draft transition letter includes the following:

- Executive Summary
- Introduction and background information on the transition
- An overview of the existing fire protection program
- A discussion of the transition process

- Demonstration of compliance with NFPA 805 requirements
  - Fundamental fire protection program and design elements,
  - Nuclear safety performance criteria,
  - Radioactive release performance criteria,
  - Non-power operational modes assessment,
  - Monitoring,
  - Program documentation, configuration control, and quality assurance,
  - Administrative implementation,
  - Personnel qualifications,
  - License amendments for alternative methods and approaches
- Defense-in-depth and safety margins
- Compliance with NFPA 805 Goals and Objectives

A sample transition report letter outline (with selected sections filled out in detail) is provided as Appendix C to this report.

3.1.2.3 Regulatory Documentation Preparation Insights

The Implementing Guidance was determined to be useful as far as it went, but did not go far enough.

- The "letter of intent" is a brand-new concept that was developed during the pilot process as a result of input from the NRC participants. Therefore, it had not been addressed in the NEI 04-02 Implementing Guidance.
- The LAR was addressed in the Implementing Guidance but the benefits of describing the process for ensuring completeness of the regulatory items to be changed or revoked was not clear. That has been added into the template.
- The transition report letter was not discussed in detail in the Implementing Guidance because the NRC had been firm about not wanting to review an extensive transition document and had not provided guidance on the level of documentation it expected to review informally for the first few plants which implement the transition process. The template (Appendix C to this report) establishes what is believed to be an adequate level of detail for the NRC to meet its need to support a licensing decision with public available information. The bulk of the technical details were not included in this template but will be available at the plant for NRC review.

Development of a draft regulatory submittal during the pilot project was beneficial. This will help industry be consistent and comprehensive in submittals and provide confidence to the NRC that the submittals and that the licensing processes are consistent.

Based upon the regulatory documentation effort during the pilot project, it was determined that a number of changes were warranted to Section 4 of NEI 04-02 to minimize duplication within the document and to reflect the "letter of intent" concept. A documentation timeline will also be added to NEI 04-02 to help explain the transition documentation process. These changes are summarized in Appendix F to this report and will be incorporated into the next revision of NEI 04-02.

3.2 Fundamental Fire Protection Program and Design Elements Transition Review

3.2.1 Transition Review Process and Results

In accordance with Section 6.2.1 and Appendix B-1 of the Draft NEI 04-02 Implementing Guidance, a review was performed of the McGuire fire protection program.

To start the transition process, the transition team had to first determine the plant's licensing basis. As for the pilot station, McGuire Units 1 & 2 submitted their application for a construction permit in September 1970 and was issued construction permits in February 1973. Therefore, McGuire Units 1 & 2 were licensed using the NRC fire protection guidelines outlined in Branch Technical Position (BTP) 9.5-1, Appendix A. Additionally, McGuire Units 1 & 2 committed to comply with 10 CFR 50, Appendix R, Sections III.G, J, and O as applicable.

The transitioning of McGuire's BTP 9.5-1, Appendix A licensing basis over to NFPA 805, Chapter 3 was relatively straightforward and made easier because McGuire had already prepared a Design Basis Document (DBD) comparing the licensing basis against BTP 9.5-1, Appendix A items. The team performing the NFPA 805, Chapter 3 transition was comprised of the Nuclear Generation Department General Office Fire Protection Engineer, the Station Fire Protection Engineer and an Electric Power Research Institute (EPRI) Implementing Team Contractor familiar with the station. The licensee staff possessed the requisite detailed knowledge of all aspects of the stations licensing basis, active and passive fire protection features and the programmatic/procedural aspects of the fire protection program.

For some of the sections of NFPA 805, Chapter 3, station subject matter experts were consulted to help complete the table. These subject matter experts provided assistance in the area of the station fire brigade and the details of the reactor coolant pump oil collection system design and configuration.

The team decided to start the transitioning process with the hardware related sections of NFPA 805 first, because this was more straightforward and helped the team build momentum before tackling the more tedious programmatic and procedural sections of NFPA 805, Chapter 3.

Using the McGuire Licensing Basis Documentation as it relates to BTP 9.5-1, Appendix A, the transitioning team systematically stepped through the requirements outlined in NFPA 805, Chapter 3. The Appendix B-1 Tables in the back of NEI-04-02 were used to determine the relative sections of BTP 9.5-1, Appendix A that map to NFPA 805, Chapter 3. One individual

on the team would review the Appendix B-1 tables and identify the sections of BTP 9.5-1, Appendix A that best matched the requirements in NFPA 805, Chapter 3. This mapping enabled the team to pinpoint the sections in BTP 9.5-1, Appendix A that would satisfy the requirements in NFPA 805. This information was copied from the station's licensing basis documentation and transposed to the NFPA 805, Chapter 3 worksheets.

The team identified items that did not strictly meet the requirements outlined in NFPA 805, Chapter 3, but was able to transition the station licensing basis over to NFPA 805, Chapter 3 because the NRC had previously approved an alternative compliance strategy. For example, McGuire Nuclear Station uses non-UL listed fire pumps. This fact had been provided to the NRC during the licensing process and was discussed in the Station's Safety Evaluation Report(s). Therefore, this previously approved alternative compliance was carried over to NFPA 805, Chapter 3 as a previously approved alternative compliance. The thought process used during the transitioning process was the philosophy of "safe today – safe tomorrow". So, if an alternative compliance strategy was "safe" during the original licensing process, it is still "safe" today for compliance with NFPA 805, Chapter 3.

Appendix G of this report provides the results of the NFPA 805 Chapter 3 transition review.

3.2.2 Fundamental Fire Protection Program and Design Elements Transition Insights

The transition process was relatively straightforward because McGuire had previously prepared a comparison document mapping their compliance to Branch Technical Position 9.5-1, Appendix A. The process would require a lot more digging into a plant licensing basis if this information was not readily available. The process of mapping over to NFPA 805 requires the team to meticulously look at how the licensee is implementing their fire protection program. Licensees that are maintaining their program in accordance with their licensing basis should have little difficulty transitioning to NFPA 805. If a licensee has not maintained compliance with their licensing basis, the transition process should uncover these oversights and the licensee would be required to bring their program back into licensing compliance before the transition process could be completed.

The team did identify requirements in NFPA 805, Chapter 3 that could not be literally met. However, after reviewing the licensing documents, it became evident that the licensee satisfied the NRC using an alternative compliance strategy. Since the NRC previously approved this alternative compliance strategy, the alternative strategy was transitioned over as also satisfying the NFPA 805, Chapter 3 requirements. During discussions with the NRC representatives during the pilot process, it became apparent that alternative compliance strategies need to be available to make the transition process seamless. The static prescriptive nature of NFPA 805, Chapter 3 requirements needs to be balanced with reasonable engineering solutions in the form of alternative compliance strategies in order to meet the objective of sound fire protection engineering solutions.

3.3 Nuclear Safety Performance Criteria Transition Review

3.3.1 Review of Safe Shutdown Methodology

In accordance with Section 6.2.2 and Appendix B-2 of the Draft NEI 04-02 Implementing Guidance, a review was performed of the McGuire safe shutdown analysis against the guidance in Appendix B of NFPA 805 and NEI 00-01, *Guidance for Post-Fire Safe Shutdown Analysis*. The guidance in NEI 04-02 is focused on the major topics associated with nuclear safety capability assessment in Section 2.4.2 of NFPA 805:

- Nuclear Safety Systems and Equipment (Section 3.3.1.1)
- Nuclear Safety Capability Circuit Analysis (Section 3.3.1.2)
- Nuclear Safety Equipment and Cable Location (Section 3.3.1.3)
- Fire Area Assessment (Section 3.3.1.4)

In order to effectively "test drive" the process, a detailed comparison was performed of the nuclear safety systems and equipment selection methodology. Since the methods used for other aspects of McGuire post-fire safe shutdown analysis were substantially different from the traditional methodology guidance in NFPA 805 Appendix B and NEI 00-01 (McGuire uses an exclusionary approach), a general review of the other sections (circuit analysis, equipment and cable locations, and fire area assessment) was performed. Appendix D to this report contains a tabular summary of the general review of the methodology (Table D-1), as well as a table with the detailed comparison of the McGuire Nuclear Safety Systems and Equipment selection methodology against NFPA 805 Appendix B guidance (Table D-2).

3.3.1.1 Nuclear Safety Systems and Equipment Review

A detailed comparison was performed of the McGuire Appendix R DBD (MCS-1465.00-00-0022) against Section B.2 of Appendix B of NFPA 805 (Nuclear Safety Systems and Equipment). This was performed to gain insight into the methodology used to identify safe shutdown systems and equipment and to understand the order of magnitude of effort that may be required to transition to a new licensing basis. There appeared to be good correlation between the Appendix R DBD and Section B.2 of Appendix B of NFPA 805 for safe shutdown systems and equipment selection. No "showstoppers" were identified during the review of systems and equipment that would result in a significant licensee burden. Refer to Table D-2 in Appendix D to this report for the results of the review.

3.3.1.2 Nuclear Safety Capability Circuit Analysis

The McGuire methodology in Appendix R DBD was reviewed (in general) against the methodology provided in Section B.3 of NFPA 805 Appendix B. There is a not a "safe shutdown cable list" or a correlation of cables to the equipment on the safe shutdown equipment list. This is inconsistent with the methods identified in Section B.3 of NFPA 805 Appendix B and Section 3.3 of NEI 00-01. Resolution of conflicts is accomplished on a fire area basis,

utilizing exclusionary methods. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805.

The McGuire methodology for associated circuits in Appendix R was reviewed (in general) against the methodology provided in Section B.3 of NFPA 805 Appendix B. The methodology used for treatment of associated circuits by common power supply and common enclosure were found to be generally consistent with the NFPA 805 Appendix B.3 methodology. No items were identified during the review that would be considered "showstoppers" or that would require substantial effort for resolution.

3.3.1.3 Nuclear Safety Equipment and Cable Location

The McGuire methodology in Appendix R DBD was reviewed (in general) against the methodology provided in Section B.4 of NFPA 805 Appendix B.

There is a not a "safe shutdown cable list" or a correlation of cables to the equipment on the safe shutdown equipment list. Therefore, there is no controlled documentation that provides the raceway and fire area routing of safe shutdown cables. Determination and documentation of cable and equipment locations and routing is performed on a case-by-case basis at McGuire. This is inconsistent with the methods identified in Section B.4 of NFPA 805 App. B and Section 3.3 of NEI 00-01.

Resolution of conflicts is accomplished on a fire area basis, utilizing exclusionary methods. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805.

3.3.1.4 Fire Area Assessment

The McGuire methodology in Appendix R DBD was reviewed (in general) against the methodology provided in Section B.5 of NFPA 805 Appendix B. The McGuire methodology is based upon resolving conflicts that are identified on a Train basis (resolve train A cables in fire areas crediting Train A for safe shutdown). Resolution of conflicts is accomplished on a fire area basis, utilizing exclusionary methods. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805.

3.3.1.5 Insights from Nuclear Safety Methodology Review

- Draft D of NEI 04-02 Implementing Guidance was geared towards a traditional methodology that assigns cables to equipment, determines the location of cables on a fire area basis, and dispositions equipment/cable failures on a fire area basis. The McGuire safe shutdown methodology utilizes an exclusionary approach that dispositions "conflicts" based upon the credited safe shutdown train within a fire area, without a specific comprehensive equipment-to-cable correlation for all safe shutdown components. This method can accomplish the same underlying goals of the approaches recommended in NFPA 805 Appendix B and NEI 00-01. The implementing guide (Section 6 and Appendix B-2) should be revised to make

sure the guidance is flexible enough to accommodate a transition with alternative approaches. This may include referral to an exclusionary approach (as outlined in Section B.5.1 Step (e)) as an acceptable method that may obviate the need to perform the prior steps.

- The introduction in Appendix B-2 should be expanded to provide additional detail on how the nuclear safety transition reviews should be conducted. This includes an update to Table B-2 that discusses that the methodology should be compared to the deterministic methods in Section 3 of NEI 00-01 (Table B-2 currently does not specify whether it is the deterministic or risk-informed, performance-based methods that the transitioning plant's methodology should be compared against).
- Due to the recent new regulatory positions on post-fire manual operator actions, a review of manual actions should be conducted as part of the transition. This review can and should be conducted on a generic plant-wide level (during the methodology review) and on a fire area basis (during the fire area review). As a minimum, it is expected that a transitioning plant would have confirmed that credited manual operator actions are feasible, using the latest NRC Inspection guidance acceptance criteria (which is/should be similar to NEI 00-01 and NFPA 805, Appendix B acceptance criteria). While it is recommended, it is not included in the overall cost estimates, since licensees will be required to review manual actions whether or not they are transitioning to a new licensing basis.
- Certain risk-informed techniques can be performed as part of the transition that impact multiple fire areas. Specifically, techniques such as those in NEI 00-01 Appendix F, which addresses how spurious component operations can be assessed for risk, could be employed to address conditions that may exist in multiple fire areas. The current implementing guidance (i.e., Figure 6-2) focuses risk-informed, performance-based assessment (change evaluations) on cases where a particular fire area is determined to be outside the current licensing basis.

Refer to Appendix F for specific NEI 04-02 comments related to nuclear safety methodology transition that were developed during the pilot project.

3.3.1.6 Overall Impression

The overall level of effort expected to be expended in the review and documentation of the safe shutdown methodology is not expected to be extensive (approximately 1- 2 weeks), provided that a plant has a documented safe shutdown methodology of reasonable quality and with a plant staff familiar with the contents of the analysis. This level of effort does not include the resolution of generic industry issues associated with post-fire safe shutdown circuit analysis and manual operator action. Both of these issues are in a state of flux with respect to regulatory requirements and industry standards (a plant will have to address these issues regardless of whether or not the plant is transitioning to a new licensing basis). This level of effort is also based upon being able to document the acceptability of alternative methods as part of the transition.

3.3.2 Fire Area Transition

In order to pilot the fire area transition review, several sample fire areas at McGuire were reviewed to determine to ability to capture key information associated with the fire area

compliance. The guidance in Section 6.2.2 of the NEI 04-02 Implementing Guidance was used, in conjunction with Appendix B-2 (Table B-3).

McGuire documentation used during the review included the Appendix R DBD, Appendix R Section III.G.3 Analysis for partial suppression/detection evaluations (Calculation MCC-1435.03-00-0009); and Fire Protection Documentation Review for UFSAR Section 9.5-1 Update, (Calculation number MCC-1435.00-00-0012). In addition, licensing documents that addressed the approval of specific plant configurations and NRC assessment(s) (i.e., Safety Evaluation Report (SER) 6 that addressed the alternative shutdown capability for McGuire) were reviewed. Discussions were also held with plant staff to gain an understanding of the level of effort necessary to review and document licensing documents and to properly identify and capture issues that would be considered to be "outside the current licensing basis" for a given fire area.

Appendix E to this report documents the results of sample McGuire fire areas that were reviewed during the pilot project.

3.3.2.1 Fire Area Transition Insights

The following insights were gained during the pilot of the fire area transition process:

- During the pilot of the fire area-by-fire area transition process in the NEI 04-02 Implementing Guidance Section 6.2.2, it was noted that the review touched more aspects of the fire area than had originally been anticipated. It is recommended that Section 6.2.2 be updated to address the "far reaching" nature of the fire area review and the need to review more than the safe shutdown aspects of the area during the review.
- The guidance in the NEI 04-02 Implementing Guidance, Appendix B-2 (Table B-3) should be expanded to include more "checklist" type of information and guidance on the completion of the table. This may help in capturing the current licensing basis associated with the fire area. This may be accomplished by adding additional columns to Table B-3 such as:
  - **Detection** – Licensing and design basis references for detection system (exemptions/deviations, SERs, Generic Letter 86-10 evaluations/code compliance evaluations, etc.). Requirements for detection systems used to meet the nuclear safety performance criteria require assessment per Chapter 3 of NFPA 805.
  - **Suppression** – Licensing and design basis references for detection system (exemptions/deviations, SERs, Generic Letter 86-10 evaluations/NFPA code compliance evaluations, etc.). Requirements for suppression systems used to meet the nuclear safety performance criteria require assessment per Chapter 3 of NFPA 805.
  - **Emergency Lighting –** Licensing and design basis references such as exemptions/deviations, SERs, calculations)
  - **Manual Actions –** Manual action information for the fire area including: 1) whether or not manual actions are relied upon for the fire area, 2) whether or not the manual

actions are previously approved by the NRC, 3) whether or not the manual actions are relied upon for post-fire safe shutdown.

- **Outstanding Current Licensing Basis Issues –** References to items that have been identified as being outside of the current licensing basis (such as corrective action documents, inspection findings and violations, and generic industry issues).

- The McGuire licensing basis contained in SERs is not always completely clear on how requirements for suppression/detection within alternative shutdown fire areas are met. Therefore, clear documentation of the current licensing basis for the fire areas may provide more value for McGuire than at other facilities with traditional exemptions and deviations.
- The guidance Table B-3 of Appendix B-2 of the NEI 04-02 Implementing Guidance should allow flexibility for grouping together fire areas for the purposes of transitioning the current licensing basis. This may be the most prudent method for documenting fire areas that are similar and that utilize similar shutdown strategies (i.e., grouping alternative shutdown fire areas).

Refer to Appendix F for specific NEI 04-02 comments related to fire area transition that were developed during the pilot project.

3.3.2.2 Overall Impression

The overall level of effort estimated for the review and documentation of the fire area current licensing basis is approximately 3 weeks. This estimate is based upon a plant that has a reasonably well documented fire protection licensing basis (where the documentation is centrally located and available without extensive searches through microfilm and hard copy files) and a plant staff familiar with the fire protection licensing basis and post-fire safe shutdown analysis. This level of effort is does not include resolving generic industry issues associated with post-fire safe shutdown circuit analysis and manual operator action. Both of these issues are in a state of flux, with respect to regulatory requirements and industry standards, and a plant will have to address these issues regardless of whether or not they are transitioning to a new licensing basis. For a plant not familiar with the fire protection licensing basis and post-fire safe shutdown analysis, approximately 6-8 weeks may be required.

3.4 Non-Power Operational Modes Transition Review

3.4.1 Scope of Review

In order to assess the level of effort required to complete a non-power operational modes transition, the McGuire outage management procedures were reviewed, using the guidance in Section 6.2.3 of Draft D of NEI 04-02 Implementing Guidance. Current fire protection insights that had been incorporated into outage management practices were also reviewed. The safe shutdown analysis for compliance with 10 CFR 50, Appendix R, was also reviewed to determine the extent that equipment used to achieve and maintain cold shutdown (i.e., the residual heat removal system) had been identified and analyzed. Given the current analysis and the intent of

NFPA 805, discussions were held between Probabilistic Risk Assessment (PRA) and Fire Protection staff to determine the best way to integrate NFPA 805 fire protection aspects into existing Outage Management Processes.

McGuire had previously conducted a low power and shutdown operations analysis based on NUREG 1449. Duke also has a Nuclear System Directive 403, Shutdown Risk Management (Modes 4, 5, 6 and No Mode) Per 10CFR50.65(A)(4), that contains a defense in depth checklist for each train alignment and evolution for outage management. To complete the transition to NFPA 805 McGuire must update the current NUREG 1449 analysis for additional components and circuits and then integrate those results with the current defense in depth checklist.

3.4.2 Overall Impressions and Insights

- Overall, Section 6.2.3 of Draft D of NEI 04-02 was understandable.
- NEI 04-02 needed some clarification with respect to definition of modes and high risk evolutions for Key Safety Functions in order to provide sufficient guidance to licensees.
- NEI 04-02 needed a Table (consistent with Appendices B-1 and B-2 of NEI 04-02) to aid in the transition.
- There is no approved risk-informed analytical method for Low Power Modes and Outage management. Thus to support the existing schedule and process this will have to be a determinist analytical process with qualitative risk insights.

Refer to Appendix F for specific NEI 04-02 comments related to non-power operational modes that were developed during the pilot project.

3.5 Radioactive Release Transition Review

3.5.1 Scope of Review

In order to assess the level of effort required to complete a radioactive release transition assessment, the McGuire pre-fire plans and fire brigade training materials were reviewed, using the guidance in Section 6.2.4 of Draft D of NEI 04-02 Implementing Guidance. McGuire has excellent pre-fire plans that generally discussed radioactive release. A Radiation Protection Shift Technician accompanies the fire brigade as an advisor to the fire brigade leader. This RP technician has the authority to stop fire fighting activity and to order evacuation of the area. This is considered satisfactory for compliance with NFPA 805 Radiation Protection requirements. Training materials for the Radiation Protection fire brigade assistance were also good, however no specific training is given to brigade team leader.

3.5.2 Overall Impressions and Insights

Overall impressions of the radioactive release transition review included:

- Overall, Section 6.2.4 of NEI 04-02 was understandable.

- The NEI 04-02 Implementing Guidance needs a Table (consistent with B-1 and B-2) to aid in the transition.

Specific suggestions made for the McGuire transition included:

- Pre-fire plans would need to be revised to give more specific guidance with respect to controlling potentially contaminated smoke and fire fighting water. (pre-fire plans address smoke control through filtered exhaust in areas susceptible to contamination.)
- Training for Fire Brigade leaders would also need to be updated to include Part 20 limits criteria.

Refer to Appendix F for specific NEI 04-02 comments related to radioactive release that were developed during the pilot project.

3.6 Program Documentation, Configuration Control, Quality Assurance, and Monitoring

3.6.1 Scope of Review

In order to assess the impact of a transition on program documentation, configuration control, quality assurance, and monitoring, the McGuire fire protection program documentation hierarchy, Maintenance Program process / procedures and plant change processes were reviewed. Sections 6.4.2 and 6.4.3 of the NEI 04-02 Implementing Guidance were used during the review. McGuire has an existing plant change process for fire protection and is currently in the review process for a change analysis that would include NEI 02-03 recommendations.

3.6.2 Overall Impressions and Insights

Overall, Sections 6.4.2 and 6.4.3 of NEI 04-02 were understandable. Suggestions made for transition included:

- Providing guidance similar to NEI 02-03 as an appendix to the Implementing Guidance
- Developing a new procedure for the change process if the change does not pass a screening process.
- Develop decision process for the appropriate level of “monitoring” that should be included for fire protection equipment (i.e., does it go in the Maintenance program or just the fire protection equipment operability control process)
- Developing a hierarchy document for how fire protection programs will fit together.
- The existing fire protection quality assurance program is sufficient for a risk-informed, performance-based program transition. The scope of fire protection features that fall under the umbrella of the fire protection quality assurance program may change based upon whether the feature(s) will continue to be credited (directly or via defense in depth analyses) under the new risk-informed, performance-based program.

Refer to Appendix F for specific NEI 04-02 comments related documentation, configuration control, quality assurance, and monitoring that were developed during the pilot project.

3.7 Change Evaluation Process Table-Top Project

During the change evaluation process table-top project, a "real world" example at Farley Nuclear Plant was reviewed by the assessment team. The example was a raceway fire barrier qualification issue in a fire area that was determined to be outside of the approved licensing basis due to indeterminate fire rating. Southern Company plans to submit a risk-informed, performance-based exemption request under 10 CFR 50.12 for the fire area, using the techniques and tools made available in NFPA 805 and the draft Implementing Guidance NEI 04-02. Although the table-top was not geared towards the transition to a new licensing basis under 10 CFR 50.48(c), the change evaluation process was essentially the same that would be used to address major issues during a transition or following the transition to a new licensing basis.

The change evaluation table-top involved the following basic steps:

- Identify/define the change from the current licensing basis.
- Determine whether the deterministic criteria in Section 4.2.3 of NFPA 805 are met. If they are met, no further analysis is required to accept the change.
- Conduct a preliminary assessment to determine whether an engineering analysis will suffice, or whether to use fire modeling, or risk assessment or a combination of the two.
- Conduct a combined fire modeling and risk assessment analysis if neither method demonstrates acceptability of the proposed change.
- For fire modeling, determine the response of the target to postulated fire conditions given the feature(s) proposed to be changed,
- If the Maximum Expected Fire Scenario (MEFS) results in target damage, fire modeling alone will not suffice to support the proposed change.
- Address uncertainty by calculating the Limiting Fire Scenario (LFS). If there is sufficient margin between the MEFS and the LFS, then fire modeling will suffice.
- Conduct a risk assessment using existing plant fire risk analyses. Determine the change in Core Damage Frequency (CDF) due to fire-induced failure of the proposed change in the fire protection program.
- Apply the acceptance criteria to determine acceptability of the change in CDF.
- Ensure defense-in-depth and safety margins are maintained.

The guidance in NEI 04-02 was viewed to be reasonable. Specific changes from the table-top project were incorporated into Draft D of NEI 04-02, which was sent to the NRC for review and comment by letter dated May 15, 2003.

3.8 Transition Cost

As part of the transition pilot project at McGuire Nuclear Station, an effort was made to quantify the cost associated with a transition to a new fire protection licensing basis. In order to accurately and fairly estimate these costs, it was important to include efforts undertaken by Duke Power prior to the pilot project. As an interested and involved licensee in the development and use of risk-informed, performance-based processes, Duke Power had participated in and funded several efforts that would help facilitate a transition to a new fire protection licensing basis at McGuire. Major efforts prior to the pilot project included:

- Comparison of the McGuire Fire Protection Program against the fundamental fire protection program and design elements in NFPA 805 Chapter 3
- Development of safe shutdown logic diagrams that provide flexibility in the accomplishing safety goals with flexibility
- Integration of fire protection into outage management processes

Based upon discussions during the pilot project and insights gained from the McGuire pilot project, it was estimated that a transition to a new fire protection licensing basis would take approximately 1200 to 3800 hours of effort. Using an hourly cost of $100 per hour for technical and management labor, this equates to a cost of approximately $120,000 to $380,000 to transition the licensing basis. This is considered a bounding estimate that accommodates various levels of plant documentation and analyses.

Key assumptions worth mentioning in the development of the cost estimates:

- These estimates did not include analytical/modification work to resolve the generic fire induced circuit failure industry issues. These issues will eventually require resolution, regardless of whether a licensee chooses to transition to a new fire protection licensing basis.
- These estimates did not include analytical/modification work to resolve the generic post-fire manual operator actions industry issues. These issues will eventually require resolution, regardless of whether a licensee chooses to transition to a new fire protection licensing basis.
- These estimates did not include technical resolution of outstanding issues, including issues that may be prompting consideration of a licensing basis transition. For example, detailed risk assessments and fire modeling that may be required (i.e., plant change evaluation) to support assessment of an identified non-conformance (i.e., raceway fire barrier qualification, suppression system adequacy, etc.). Resolution of these issues is dependent upon the magnitude and complexity of the issues requiring resolution.

Table 3-1 provides numbers and assumptions used in the development of the estimates.

Table 3-1
Transition Estimates

Transition Task	McGuire Hours*		Generic Hours	
	Spent to Date	To Complete	Low	High
Draft Letter of Intent and License Application		40	40	40
Draft Letters				
Transition of Fundamental Fire Protection Program	350	40	40	400
Fill out appropriate IG Appendix B-1 table				
Transition of Nuclear Safety Analysis				
Method**	1000	600	120	1600
Fire area		120	80	120
86-10 and Exemption Transition		320	80	320
Perform Shutdown Operations Review	400	600	600	1000
Identify Equipment				
Identify Locations that are vulnerable				
Modify Outage Management Procedure				
Perform Radioactive Release Review		40	40	120
Update Training and Pre-Fire Plans				
Update Configuration Control Procedures				
New Change Procedure		80	80	80
Update FP Regulatory Review Procedure		40	40	40
Update Monitoring Program		120	80	120
Verify that all features credited are in monitoring program				
Estimated Total for Transition	**3750**		**1200**	**3840**
Assuming an hourly rate of 100 - $ estimate would be	**$ 375,000**		**$ 120,000**	**$ 384,000**

* McGuire spent prior to Transition Pilot

Fundamental Review (including 1 month of Clerical support)	$ 28,000
Development of Logics	$ 100,000
Risk Informed NEI 00-01 Pilot	$ 100,000

** Method
McGuire and 'High Generic Hour' estimates include transitions to a Risk Informed SSD Analysis
Does not include a manual action feasibility evaluation or a FICF analysis

4
CONCLUSIONS

Overall, the Implementing Guide was determined to be effective in transitioning to a new fire protection licensing basis. A number of areas of improvement were identified, and comments were generated to improve the effectiveness of the guide. The "transition tables" included as Appendices to the Implementing Guide are important tools to demonstrate how the plant meets NFPA 805 licensing basis. The NEI 04-02 comments developed during the pilot project are included as Appendix F to this report. NEI 04-02 is developed using the "safe today - safe tomorrow" concept that does not require or expect full scale validation of fire protection programs as a "cost of entry" to a transitioning licensee. As long as the NRC continues to support and endorse this concept, NEI 04-02 should provide the guidance necessary to guide the transitioning licensee.

5
REFERENCES

1. 10 CFR 50, Appendix A, General Design Criterion (GDC) 3, Fire Protection

2. 10 CFR 50.12, *Specific exemptions*

3. 10 CFR 50.48, *Fire Protection*

4. 10 CFR 50, Appendix R, *Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979, Sections III.G, J, L, and O*

5. Appendix A to Branch Technical Position BTP APCSB 9.5-1, *Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976*

6. Generic Letter 86-10, *Implementation of Fire Protection Requirements*

7. Regulatory Guide 1.189, *Fire Protection for Operating Nuclear Power Plants*, dated April 2001

8. Regulatory Guide 1.174, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, dated July 1998.

9. NFPA 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants*, 2001 Edition.

10. NEI 04-02, Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c), Draft Revision D (May 15, 2003) [ADAMS Accession Nos. ML031350530, ML031350544, ML0313505610, ML031350567, ML031350574, ML031350580, ML031350588, ML031350592, and ML031350596]

11. NEI 00-01, *Guidance for Post-Fire Safe Shutdown Analysis*, Revision 0

12. NEI 02-03, *Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program*, Revision 0

Refer to Appendices for Duke Energy/McGuire specific references utilized during the pilot project.

A
LETTER OF INTENT

[Date]

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: [Facility Name]
[Facility Docket numbers]
Adoption of NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants, 2001 Edition

This letter serves to inform you of [Facility Name] intent to adopt NFPA 805 (Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants, 2001 Edition) in accordance with 10 CFR 50.48(c).

The transition to the performance-based standard for fire protection is expected to commence in [month/quarter, year] and take [total estimated time (in months)] to fully implement. The activities that need to be performed in order to support this transition include:

[Outline the activities that are needed to support the transition.]

[Include a timetable with the anticipated completion date for transition milestones and implementation phase activities.]

This schedule is subject to change depending on the extent to which the plant determines that it needs to make either physical modifications or changes to the fire protection program to comply with NFPA 805. An updated schedule will accompany the license amendment request required under 10 CFR 50.48(c)(3)(i).

{*Optional statement regarding enforcement discretion. This statement may not be needed if the NRC issues an Enforcement Guidance Memorandum (EGM) that would provide such discretion.*

It is our understanding that this letter of intent initiates a period of enforcement discretion during which no enforcement actions will be taken for non-compliances discovered as a result of evaluations conducted to support this licensing basis transition process.}

B
SAMPLE LICENSEE AMENDMENT REQUEST

[Date]

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: [Facility Name]
[Facility Docket numbers]
License Amendment Request to Adopt NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants, 2001 Edition

Pursuant to Title, Code of Federal Regulations (CFR), Part 50, Section 90 (10 CFR 50.90), [Facility Name] proposes to amend Appendix A, Technical Specifications (Tech Specs), for Facility Operating Licenses [License Numbers] for [Facility Name] [Identify the Technical Specifications that need to be amended (including changes to the bases).] This amendment is needed to support the adoption of NFPA 805 Performance-Based Standard for Fire Protection, 2001 Edition in accordance with 10 CFR 50.48(c). The proposed License Amendment Request (LAR) revises the licensing basis associated with the Fire Protection Program.

The following process was used to determine that these are the only Technical Specifications that require amendment. [Describe the process.]

In addition, [Facility Name] also requests that the license be amended to remove the following superseded license conditions [identify license conditions to be superseded] and replace them with the following suggested license condition authorizing the use of NFPA 805.

As a separate but related matter, [Facility Name] has identified the following unnecessary or superseded orders and exemptions that are required to be revoked [identify orders and exemptions]. The following process was conducted to identify all of the orders and exemptions that are required to be revoked. [Describe the process used to ensure completeness of the set of orders and exemptions that are required to be revoked.]

[Facility Name] has also identified the following NFPA 805 Chapter 3 requirements that cannot be considered previously approved alternatives from the fundamental program attributes. [Describe the process used to ensure completeness of the additional LAR requests.]

Implementation of this amendment to the [Facility Name] operating license and Tech Specs will impact the [Facility Name] UFSAR. As a result of implementing this LAR, it will be necessary to revise various sections of the [Facility Name] UFSAR. Necessary changes will be made in accordance with 10 CFR 50.71(e).

Plant modifications are/are not necessary to support the adoption of NFPA 805. [Provide a brief description of the modifications].

[Facility Name] plans to implement this/these modification(s) by the dates shown in the following updated transition schedule. [Insert update of schedule provided in letter of intent] Approval of this proposed LAR is requested by [month, day, year] to support this transition schedule.

Implementation of these changes will not result in an undue risk to the health and safety of the public.

Attachments:

No Significant Hazards Consideration
Environmental Impact Assessment

Attachment

No Significant Hazards Consideration Finding

Pursuant to 10 CFR 50.91, [company name] has made the determination that, based on the following NRC statements in the Statements of Consideration accompanying the adoption of alternative fire protection requirements, and other considerations, this amendment request involves No Significant Hazards Consideration under the standards established by the NRC in 10 CFR 50.92. This ensures that, the operation of the facility in accordance with the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated

   NFPA 805, taken as a whole, provides an acceptable alternative for satisfying General Design Criterion 3 (GDC 3) of Appendix A to 10 CFR 50, meets the underlying intent of the NRC's existing fire protection regulations and guidance, and achieves defense-in-depth and the goals, performance objectives, and performance criteria specified in Chapter 1 of the standard and, if there are any increases in core damage frequency (CDF) or risk, the increase will be small and consistent with the intent of the Commission's Safety Goal Policy. [cite]

2. Create the possibility of a new or different kind of accident from any kind of accident previously evaluated

   The requirements in NFPA 805 address only fire protection and the impacts of fire on the plant have already been evaluated.

3. Involve a significant reduction in the 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 license basis changes, as described in Regulatory Guide (Reg. Guide) 1.1.74, is consistent with the defense-in-depth philosophy, and maintains sufficient safety margins and [cite]

Accordingly, [Facility Name] adoption of the new fire protection rule based on NFPA 805 does not present a significant hazards consideration.

Attachment

Environmental Assessment

Pursuant to 10 CFR 51.22(b), an evaluation of the license amendment request (LAR) has been performed to determine whether it meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c). The LAR does not involve:

1. A significant hazards consideration.

   This conclusion is supported by the determination of no significant hazards consideration.

2. A significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

   Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives, and goals for radioactive releases to the environment. Therefore, this LAR will not change the types or amounts of any effluents that may be released offsite.

3. A significant increase in the individual or cumulative occupational radiation exposure.

   Compliance with NFPA 805 explicitly requires the attainment of performance criteria, objectives, and goals for occupational exposures. Therefore, this LAR will not change the types or amounts of occupational exposures.

In summary, this LAR meets the criteria set forth in 10 CFR 51.22(c)(9) for categorical exclusion from the need for an environmental impact statement.

C
SAMPLE TRANSITION REPORT

1.0 Introduction

The Nuclear Regulatory Commission (NRC) has adopted a voluntary alternative rule for fire protection requirements at nuclear power plants, 10 CFR 50.48(c). McGuire Nuclear Station (McGuire) has stated its intention to transition its fire protection licensing basis to comply with the new requirements. See, Letter of Intent dated xxxxxx. This document describes the transition process applied by McGuire and the results that demonstrate compliance with the new voluntary requirements.

1.1 Background

In 1981, the NRC adopted 10 CFR 50, Appendix R, which imposed prescriptive fire protection requirements on certain licensees. Subsequent developments in the understanding of fires, fire modeling and probabilistic risk analysis (PRA) have led to the conclusion that alternative risk-informed, performance-based requirements would maintain fire safety while eliminating unnecessary regulatory burden.

In 2001, the National Fire Protection Association (NFPA) adopted NFPA 805, Performance Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants. In 2002, the NRC proposed to adopt NFPA 805, with limited exceptions, as a voluntary alternative to the fire protection requirements then contained in 10 CFR 50, Appendix A, General Design Criterion 3, 10 CFR 50.48 and 10 CFR 50, Appendix R. Contemporaneously, the Nuclear Energy Institute (NEI) began to develop NEI 04-02, *Guidance for Implementing A Risk-Informed, Performance-Based Fire protection Program Under 10 CFR 50.48(c)*. That guidance was developed with substantial input from the NRC and is expected to be incorporated into an NRC Regulatory Guide. In 2004, the NRC plans to adopt the voluntary, alternative, risk-informed, performance-based fire protection requirements.

McGuire has been active in the NRC's adoption of the voluntary requirements and the development of the Implementing Guide. McGuire volunteered to be a pilot plant to demonstrate the usability of the Implementing Guide for transitioning its deterministic licensing basis to compliance with the alternative requirements. The pilot was conducted to determine the usability of the guidance and to identify opportunities to improve the guidance. Improvement opportunities were identified and the guidance was revised to include them. NRC personnel participated in McGuire's piloting of the Implementing Guide. McGuire has completed its evaluation of the transition of its fire protection licensing basis and has concluded that it can comply with the new requirements.

1.2 Purpose and Scope

The purposes of this report are to: (1) describe the process implemented by McGuire to transition its fire protection program to demonstrate compliance with the requirements in 10 CFR 50.48(c); (2) summarize the results of McGuire's transition process; (3) explain the bases for McGuire's conclusions that its current fire protection program, with certain modifications, comply with those requirements; and (4) to outline the documentation hierarchy going forward . McGuire's transition process was based on NEI's Implementing Guide. Detailed results of that process are available for review at McGuire.

The results of the transition process are summarized in this report. The results focus on demonstrating compliance with the requirements in the NRC's new rule. Finally, the basis is provided for McGuire's conclusion that it can transition its fire protection program to meet the new requirements upon the completion of certain activities identified in this letter.

2.0 Overview of Existing Fire Protection Program

2.1 Current Licensing Basis

McGuire's two units were licensed to operate after January 1, 1979. Accordingly, under 10 CFR 50.48, McGuire is not subject to Appendix R. However, McGuire's operating license contains a condition that commits McGuire to "Appendix R as applicable" and requires McGuire to maintain the fire protection program described in certain Safety Evaluation Reports (SER).

2.2 Applicable Regulatory Requirements

[Insert a list of applicable regulatory requirements]

3.0 Transition Process

The process for transitioning from compliance with the current licensing basis to the new requirements is described in general in Section 4.0 of the Implementing Guide. It contemplates the following steps: (1) licensee determination to transition the licensing basis and devote the necessary resources to it; (2) letter of intent to the NRC stating the licensee's intention to transition the licensing basis in accordance with a tentative schedule; (3) licensee conduct of the transition process to determine the extent to which the current licensing basis supports compliance with the new requirements and the extent to which additional analyses and plant and program changes are needed; (4) filing of license amendment request; and (5) completion of transition activities and adoption of the new licensing basis consistent with the NRC's grant of the license amendment.

McGuire followed a somewhat different process because it implemented the process as a pilot plant. In particular, McGuire did not submit a letter of intent before proceeding to conduct an extensive evaluation of its fire protection program for compliance with the new requirements in NFPA 805, as adopted by the NRC. McGuire personnel worked with the expert team that drafted the Implementing Guide to pilot its application. McGuire personnel and the expert team

together conducted a portion of the extensive technical evaluations described in the Implementing Guide. This ensured that McGuire was fully informed about how the Implementing Guide was to be applied and that the drafting team was aware of difficulties that needed to be addressed.

3.1 Implementation of NFPA 805, Section 2.2: General Approach

Section 2.2 of NFPA 805 establishes the general process for demonstrating compliance with NFPA 805. The process is illustrated in Figure 2.2 of NFPA 805. It shows that except for the fundamental fire protection requirements, compliance can be achieved on a fire area basis either by deterministic or performance-based methods. McGuire implemented this process by first determining the extent to which its current fire protection program supported findings of deterministic compliance with the requirements in NFPA 805. Risk-informed, performance based methods were then applied to the few requirements for which deterministic compliance could not be shown.

3.1.1 Implementing Guidance, Section 6.0

Section 6.0 of the Implementing Guide describes the detailed process for assessing a fire protection program for the extent to which it supports a showing of compliance with NFPA 805. McGuire conducted the detailed evaluation processes by establishing teams comprised of knowledgeable plant personnel and outside experts who were members of the Implementing Guidance drafting team. The assessment processes used by these teams and the results of their assessments are discussed in detail below.

4.0 Demonstrations of Compliance with NFPA 805 Requirements

4.1 Fundamental Fire Protection Program and Design Elements

The Fundamental Fire Protection Program and Design Elements are established in Chapter 3 of NFPA 805. Section 6.2.1 of the Implementing Guidance sets out a systematic process for determining the extent to which the current licensing basis meets these criteria and for identifying the fire protection program changes that would be necessary for complete compliance with these criteria.

4.1.1 Overview of Implementing Guide Appendix B-1 process for mapping current licensing basis to requirements in Chapter 3 of NFPA 805

Appendix B-1 of the Implementing Guidance provides a mapping of the Fire Protection Program Fundamentals of Chapter 3 to NFPA 805 to the appropriate NRC Guidance Documents (BTP9.5-1, NUREG 0800, etc.). Each section and subsection of Chapter 3 is a "Fundamental Fire Protection Program Attribute" defining the program and design elements of a nuclear fire protection program. The cross-reference table(s) included as Appendix B-1 serves as a starting point for determining "previously acceptable" methods of compliance with that particular fire protection program attribute.

McGuire personnel provided specific compliance statements with appropriate references (deviations, exemptions, etc) to demonstrate "previous approval" of an alternative or compliance with the Chapter 3 attribute. Once this mapping was completed all previous commitments are superseded by compliance with the new rule.

4.1.2 Results of application of the Implementing Guidance Appendix B-1 mapping process

4.1.2.1 Chapter 3 requirements previously approved by NRC

Items from NFPA 805 Chapter 3 that were previously approved are included in the Implementing Guidance Appendix B-1 Table [Utility should include complete mapping table as attachment to Transition Report].

The following is an example of the types of items included in Chapter 3 of NFPA 805 but without a corresponding requirement in McGuire's licensing basis:

- NFPA Section 3.5.13 McGuire is licensed using BTP 9.5-1, Appendix A that does not require seismically designed standpipe systems. Therefore, this requirement is not applicable to McGuire since this plant was approved without seismically designed standpipes.

4.1.2.2 Chapter 3 requirements not previously approved by NRC

During the Pilot Project, no items without previous approval were discovered. It is envisioned that a transitioning Licensee would list the items for which previous approval could not be determined.

4.1.2.3 Actions to be taken to establish compliance

For the cases where compliance could not be demonstrated, it is envisioned that a Licensee would a) comply with the deterministic requirements of NFPA Chapter 3 or b) prepare a risk-informed, performance-based evaluation as part of the transitional License Amendment. The Licensee would summarize actions to be taken to establish compliance.

4.2 Nuclear Safety Performance Criteria

Five nuclear safety performance criteria are established in Section 1.5.1 of NFPA 805. Section 6.2.2 of the Implementing Guidance sets out a systematic process for determining the extent to which the current licensing basis meets these criteria and for identifying the fire protection program changes that would be necessary for complete compliance with these criteria.

4.2.1 Overview of Appendix B-2 transition review process for demonstrating compliance with Chapters 2 and 4 of NFPA 805

Appendix B-2 of the Implementing Guidance identifies five program elements that are to be evaluated for compliance with the requirements in NFPA 805. They are:

- Nuclear safety capability system and equipment selection
- Nuclear safety capability circuit analysis
- Circuits required in nuclear safety functions
- Other required circuits (associated circuits)
- Nuclear safety equipment and cable location
- Fire area assessments

For all but the fire area assessments, the compliance determination strategy is to: (1) compare the methodology used to establish the current licensing basis with the corresponding methodology provided in either NFPA 805 or NEI 00-01; (2) identify inconsistencies; and (3) perform any needed modifications and analyses. For the fire area assessments, a detailed fire area by fire area review is conducted to identify the equipment that implements compliance with the nuclear safety performance criteria.

4.2.2 Comparison of methodology used to develop current Safe Shutdown Equipment List with applicable new methodology

McGuire's methodology for developing its current Safe Shutdown Equipment List is contained in McGuire DBD MCS-1465.00-00-0022 (DBD). The methodology in the DBD was compared in detail to the methodology in Section B.2 of Appendix B of NFPA 805 (Nuclear Safety Systems and Equipment). For each methodology element of Section B.2 the corresponding methodology element was identified in the DBD. Each pair of corresponding elements was compared for assumptions and factors considered.

4.2.2.1 Determination of extent of consistency of methods

There appeared to be a good correlation between the methods in the DBD and Section B.2. Although, there are differences between the details in some pairs of methodology elements, those differences were determined not to result in safety significant differences in the lists of safe shutdown equipment that would be generated by both methods. This was corroborated by comparing a sample of the lists of safe shutdown equipment generated by the two methods. Details of the comparison are contained in Appendix X [It is envisioned that something similar to Appendix D to this pilot report would be included with the transition report].

4.2.2.2 Modifications and additional analyses for compliance

No modifications or additional analyses were required to establish compliance with the methodology elements in Section B.2.

4.2.3 Comparison of methodology used for current Circuit Analysis with applicable new methodology

McGuire's methodology for conducting circuit analyses is contained in Specification MCS-1465.00-00-0022 ("Appendix R DBD"). It is an exclusionary methodology that dispositions

"conflicts" based upon the credited safe shutdown train within a fire area, without a specific comprehensive equipment-to-cable correlation for all safe shutdown components. The methodology in the Appendix R DBD was compared, in general, with the methodology in Section B.3 of NFPA 805 Appendix B. It was not possible to make a detailed comparison between the constituent elements of the two methodologies because McGuire's exclusionary method does not require the development of a safe shutdown cable list or a correlation of cables to the equipment on the safe shutdown equipment list.

4.2.3.1 Determination of extent of consistency of methods

McGuire's methodology is necessarily inconsistent with the methods identified in Section B.3 of NFPA 805 App. B and Section 3.3 of NEI 00-01 because McGuire's exclusionary methodology does not use a safe shutdown cable list.

4.2.3.2 Modifications and additional analyses for compliance

McGuire's methodology for conducting circuit analyses can be shown to satisfy the criteria in NFPA 805 by conducting additional analyses. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805. Therefore, inconsistencies between the methods can be resolved on a fire area basis, utilizing exclusionary methods.

4.2.4 Comparison of methodology used for current Associated Circuit analysis with applicable new methodology

McGuire's methodology for analyzing associated circuits is contained in the Appendix R DBD. The methodology in it was compared, in general, with the methodology in Section B.3 of NFPA 805 Appendix B.

See the discussion above for Section 4.2.4.2.

4.2.4.1 Determination of extent of consistency of methods

The methodology used for analyzing associated circuits with a common power supply or common enclosure were found to be generally consistent with the NFPA 805 Appendix B.3 methodology.

4.2.4.2 Modifications and additional analyses for compliance

Some items will require additional analysis to demonstrate compliance.

4.2.5 Comparison of methodology used for Equipment Cable and Location analysis with applicable new methodology

McGuire's methodology for equipment cable and location analysis is contained in the Appendix R DBD. That methodology was compared, in general, against the methodology in Section B.4 of

NFPA 805 Appendix B. It was not possible to make a detailed comparison of the constituents of the two methodologies because McGuire does not have a safe shutdown cable list or a correlation of cables to the equipment on the safe shutdown equipment list.

4.2.5.1 Determination of extent of consistency of methods

McGuire's methodology for equipment cable and location analysis is inconsistent with the methods identified in Section B.4 of NFPA 805 App. B and Section 3.3 of NEI 00-01. There is no controlled documentation that provides the raceway and fire area routing of safe shutdown cables. The determination and documentation of cable and equipment locations and routing is performed on a case-by-case basis at McGuire.

4.2.5.2 Modifications and additional analyses for compliance

McGuire's methodology for equipment cable and location analyses can be shown to satisfy the criteria in NFPA 805 by conducting additional analyses. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805. Therefore, inconsistencies between the methods can be resolved on a fire area basis, utilizing exclusionary methods.

4.2.6 Overview of Table B-3 process for making fire area assessments to determine effects of fire or fire suppression on compliance with nuclear safety performance criteria.

Using the templates provided in the NEI 04-02 Implementing Guidance, Appendix B-2 (Table B-3) summarize the current licensing basis associated with each fire area. This should include information such as:

- Current Licensing Basis (i.e., III.G.2, III.G.3, etc) including approved exemptions/deviations
- Detection – Licensing and design basis references for detection system (exemptions/deviations, SERs, Generic Letter 86-10 evaluations/code compliance evaluations, etc.). Requirements for detection systems used to meet the nuclear safety performance criteria require assessment per Chapter 3 of NFPA 805.
- Suppression – Licensing and design basis references for detection system (exemptions/deviations, SERs, Generic Letter 86-10 evaluations/NFPA code compliance evaluations, etc.). Requirements for suppression systems used to meet the nuclear safety performance criteria require assessment per Chapter 3 of NFPA 805.
- Emergency Lighting – Licensing and design basis references such as exemptions/deviations, SERs, calculations)
- Manual Actions – Manual action information for the fire area including: 1) whether or not manual actions are relied upon for the fire area, 2) whether or not the manual actions are previously approved by the NRC, 3) whether or not the manual actions are relied upon for post-fire safe shutdown.

- Outstanding Current Licensing Basis Issues – References to items that have been identified as being outside of the current licensing basis (such as corrective action documents, inspection findings and violations, and generic industry issues).

It is envisioned that Implementing Guidance Table B-3 would serve as a template for that transition and be included as an attachment to the Transition Report.

4.2.6.1 Deterministic methods

A licensee will list those fire areas that are transitioning under the "grandfathered" deterministic option.

4.2.6.2 Risk-informed, performance-based methods

A licensee will list those fire areas that are transitioning using the risk-informed, performance-based techniques contained in NFPA 805. Included for these areas should be a summary of the basis for acceptability of that change. References should be given to the detailed analyses performed as part of the transition.

4.2.6.3 Modifications to achieve compliance

A licensee will list any modifications necessary to bring the plant into compliance with either the deterministic or performance based acceptance criteria. The schedule for these modifications should be included in the License Amendment Request.

4.2.7 Nuclear Safety Performance Criteria in non-power modes

Using the templates provided in the NEI 04-02 Implementing Guidance, summarize the current licensing basis associated with non-power modes. This should include information such as:

- Current outage management procedures
- Current fire protection insights that had been incorporated into outage management practices
- The safe shutdown analysis for compliance with 10 CFR 50, Appendix R, to determine the extent that equipment used to achieve and maintain cold shutdown (i.e., the residual heat removal system) had been identified and analyzed.

4.2.7.1 Overview of qualitative risk-informed evaluation process

Given the current analysis and the intent of NFPA 805, discussions were held between Probabilistic Risk Assessment (PRA) and Fire Protection staff to determine the best way to integrate NFPA 805 fire protection aspects into existing Outage Management Processes.

McGuire had previously conducted a low power and shutdown operations analysis based on NUREG 1449. Duke also has a Nuclear System Directive 403, Shutdown Risk Management (Modes 4, 5, 6 and No Mode) Per 10CFR50.65(A)(4), that contains a defense in depth checklist for each train alignment and evolution for outage management.

4.2.7.2 Results from risk-informed evaluation process

It is envisioned that a Licensee will summarize the procedures and processes to be used/modified to meet the low power operations criteria. For example to complete the transition to NFPA 805 McGuire must update the current NUREG 1449 analysis for additional components and circuits and then integrate those results with the current defense in depth checklist.

4.3 Radioactive Release Performance Criteria

4.3.1 Overview of evaluation process

Using the templates provided in the NEI 04-02 Implementing Guidance, summarize the current information associated with control of radioactive release due to fire fighting. This should include information such as:

- Pre-fire plans
- Training materials for Fire Brigade members

4.3.2 Results from evaluation process

It is envisioned that a Licensee will summarize the procedures and processes to be used/modified to meet the low power operations criteria. For example to complete the transition to NFPA 805 McGuire must update the current NUREG 1449 analysis for additional components and circuits and then integrate those results with the current defense in depth checklist.

Specific suggestions made for the McGuire transition included:

- Pre-fire plans would need to be revised to give more specific guidance with respect to controlling potentially contaminated smoke and fire fighting water. (pre-fire plans address smoke control through filtered exhaust in areas susceptible to contamination.)
- Training for Fire Brigade leaders would also need to be updated to include Part 20 limits criteria.

4.4 Monitoring Program

In order to assess the impact of a transition on the current monitoring program, the McGuire fire protection program documentation hierarchy, maintenance program process / procedures and plant change processes were reviewed. Sections 6.4.2 and 6.4.3 of the NEI 04-02 Implementing Guidance were used during the review.

4.4.1 Compliance with Section 2.6 of NFPA 805

4.4.1.1 Extent of reliance on current programs

It is envisioned that a Licensee will summarize the extent to which current programs/processes may be relied upon.

4.4.1.2 Overview of additional program elements

It is envisioned that a Licensee will summarize the necessary upgrades to the monitoring program. For example, during the McGuire Pilot Project the need for a decision process for the appropriate level of "monitoring" that should be included for fire protection equipment was identified (i.e., does it go in the Maintenance program or just the fire protection equipment operability control process).

4.4.1.3 Phased process for expanding monitoring program

This section will contain an overview of the schedule to implement the monitoring program.

4.5 Program Documentation, Configuration Control, and Quality Assurance

It is envisioned that the Licensee will develop a hierarchy document for how fire protection program procedures and documentation will fit together. This should be included in this section and divided into the following two subsections.

4.5.1 Compliance with documentation requirements in Section 2.7.1 of NFPA 805

4.5.2 Compliance with configuration control requirements in Section 2.7.2 of NFPA 805

4.5.2.1 Extent of reliance on current programs

It is envisioned that a Licensee will summarize the extent to which current programs/processes may be relied upon.

The existing fire protection quality assurance program is sufficient for a risk-informed, performance-based program transition. The scope of fire protection features that fall under the umbrella of the fire protection quality assurance program may change based upon whether the feature(s) will continue to be credited (directly or via defense in depth analyses) under the new risk-informed, performance-based program.

4.5.2.2 Overview of additional program elements

It is envisioned that a Licensee will summarize the necessary upgrades to the fire protection/configuration control/quality assurance programs. For example, during the McGuire Pilot Project the following were identified:

- Need to provide guidance similar to NEI 02-03 for assessing changes
- Need to develop a new procedure for the change process if the change does not pass a screening process.

D

NUCLEAR SAFETY TRANSITION - PERFORMANCE CRITERIA AND METHOD

Table D-1
NFPA 805 Chapter 2 – Nuclear Safety Transition Review Guidance (NEI 04-01, Draft D, Table B-2)

NFPA 805 Requirement	Implementing Guidance
2.4.2.1 Nuclear Safety Capability System and Equipment Section A comprehensive list of systems and equipment and their interrelationships to be analyzed for a fire event shall be developed. The equipment list shall contain an inventory of those critical components required to achieve the nuclear safety performance criteria of Section 1.5. Components required to achieve and maintain the nuclear safety functions and components whose fire-induced failure could prevent the operation or result in the maloperation of those components needed to meet the nuclear safety criteria shall be included. Availability and reliability of equipment selected shall be evaluated. *(See Appendix B for acceptable methods used to identify equipment)*	The McGuire methodology in Appendix R DBD (Specification MCS-1465.00-00-0022) was reviewed against the methodology provided in Section B.2 of NFPA 805 Appendix B. The methodology used for selection of safe shutdown systems and equipment was found to be generally consistent with the NFPA 805 Appendix B.2 criteria. No items were identified during the review that would be considered "showstoppers" or that would require substantial effort for resolution.
2.4.2.2 Nuclear Safety Capability Circuit Analysis. **2.4.2.2.1 Circuits Required in Nuclear Safety Functions.** 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. 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. This will ensure that a comprehensive population of circuitry is evaluated. *(See Appendix B for considerations in analyzing circuits.)*	The McGuire methodology in Appendix R DBD (Specification MCS-1465.00-00-0022) was reviewed (in general) against the methodology provided in Section B.2 of NFPA 805 Appendix B. There is not a "safe shutdown cable list" or a correlation of cables to the equipment on the safe shutdown equipment list. This is inconsistent with the methods identified in Section B.3 of NFPA 805 App. B and Section 3.3 of NEI 00-01. Resolution of conflicts is accomplished on a fire area basis, utilizing exclusionary methods. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805.
2.4.2.2.2 Other Required Circuits. Other circuits that share common power supply and/or common enclosure with circuits required to achieve nuclear safety performance criteria shall be evaluated for their impact on the ability to achieve nuclear safety performance criteria.	The McGuire methodology in Appendix R DBD (Specification MCS-1465.00-00-0022) was reviewed (in general) against the methodology provided in Section B.3 of NFPA 805 Appendix B. The methodology used for treatment of associated circuits by common power supply and common enclosure were found to be generally consistent with the NFPA 805 Appendix B.3 methodology. No items were identified during the

NFPA 805 Requirement	Implementing Guidance
(a) *Common Power Supply Circuits.* Those circuits whose fire-induced failure could cause the loss of a power supply required to achieve the nuclear safety performance criteria shall be identified. This situation could occur if the upstream protection device (i.e., breaker or fuse) is not properly coordinated with the downstream protection device. *(See Appendix B for considerations when analyzing common power supply concerns.)* (b) *Common Enclosure Circuits.* Those circuits that share enclosures with circuits required to achieve the nuclear safety performance criteria and whose fire-induced failure could cause the loss of the required components shall be identified. The concern is that the effects of a fire can extend outside of the immediate fire area due to fire-induced electrical faults on inadequately protected cables or via inadequately sealed fire area boundaries. *(See Appendix B for considerations when analyzing common enclosure concerns.)*	review that would be considered "showstoppers" or that would require substantial effort for resolution.
2.4.2.3* Nuclear Safety Equipment and Cable Location. Physical location of equipment and cables shall be identified. *(See Appendix B for considerations when identifying locations.)*	The McGuire methodology in Appendix R DBD (Specification MCS-1465.00-00-0022) was reviewed (in general) against the methodology provided in Section B.4 of NFPA 805 Appendix B. There is a not a "safe shutdown cable list" or a correlation of cables to the equipment on the safe shutdown equipment list. Therefore, there is no controlled documentation that provides the raceway and fire area routing of safe shutdown cables. Determination and documentation of cable and equipment locations and routing is performed on a case-by-case basis at McGuire. This is inconsistent with the methods identified in Section B.4 of NFPA 805 App. B and Section 3.3 of NEI 00-01. Resolution of conflicts is accomplished on a fire area basis, utilizing exclusionary methods. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805.

NFPA 805 Requirement	Implementing Guidance
2.4.2.4 Fire Area Assessment. 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. *[See Chapter 4 for methods of achieving these performance criteria (performance-based or deterministic). (See Appendix B for considerations when performing the fire area assessments.)*	The McGuire methodology in Appendix R DBD (Specification MCS-1465.00-00-0022) was reviewed (in general) against the methodology provided in Section B.5 of NFPA 805 Appendix B. The McGuire methodology is based upon resolving conflicts that are identified on a Train basis (resolve train A cables in fire areas crediting Train A for safe shutdown). This is an exclusionary method. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805. Resolution of conflicts is accomplished on a fire area basis, utilizing exclusionary methods. Exclusionary methods are defined as an acceptable method of fire area assessment in Step 2 of Section B.5.1 item (e) of Appendix B to NFPA 805.

Table D-2
Nuclear Safety Systems and Equipment Selection (Detailed Comparison) McGuire Methodology vs. NFPA 805 Appendix B.2

NFPA 805 Appendix B Reference	Compliance Reference
B.1 Nuclear Safety Assessment. The primary purpose of the nuclear safety assessment is to demonstrate that given cable and equipment damage due to a fire postulated in any fire area, sufficient equipment remains available to achieve the following nuclear safety performance criteria (*see Section 1.5*): (1) Reactivity control (2) Inventory and pressure control (3) Decay heat removal (4) Vital auxiliaries (5) Process monitoring The purpose of this appendix is to identify attributes that should be considered when demonstrating this capability. Other risk informed–performance-based methods acceptable to the AHJ are permitted.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.1 (p. 20)
B.2 Nuclear Safety Systems and Equipment. A list of systems and equipment that ensure the nuclear safety performance criteria can be achieved during and after a plant fire, regardless of fire location, should be developed. This process can be iterative and can require revisions to incorporate fire risk significant systems and equipment, if further analysis in the circuit analysis or fire area assessment determine additional systems or equipment to be fire risk significant. The process that follows describes the initial attempt to determine which systems and equipment require evaluation. Other risk informed–performance-based methods acceptable to the AHJ can be used to refine the list of nuclear safety systems and equipment. The set of systems and equipment to be considered for nuclear safety should address, as a minimum, the following. (a) Systems and equipment required to place the plant in a safe and stable condition following a fire occurring while the plant is at power, or while maintaining hot standby or hot shutdown. This fire also could result in a loss of off-site power, which would require achieving safe and stable conditions using power from on-site ac sources (i.e., emergency diesel generators). This is typically a traditional Appendix R to 10 *CFR* 50 post-fire safe shutdown analysis. (b) Systems and equipment required to maintain shutdown cooling capability following a fire originating while the plant is in the shutdown cooling mode.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3

NFPA 805 Appendix B Reference	Compliance Reference
B.2.1 Assumptions (Plant Conditions at Time of Postulated Fire). In addition to the assumptions in Chapter 2, the following assumptions apply to this appendix. (a) The plant is in a standard lineup governed by operating procedures, operating modes, or administrative controls at the onset of the fire. (b) Properly oriented check valves function to prevent reverse flow in process systems. (c) Normally closed manual valves (hand-operated only) will remain undamaged by a fire and can be relied upon for system boundary isolation. (d) Instruments located in a fire affected area (e.g., RTDs, thermocouples, pressure transmitters, flow transmitters, and mechanically linked remote/local indications) are assumed to be damaged unless it can be demonstrated otherwise. The instrument fluid boundary associated with these devices, with the exception of soldered fittings, is assumed to remain intact. (e) Piping, check valves, strainers, tanks, manual valves, heat exchangers, safety relief valves, and pressure vessels are assumed to remain functional during and after a fire. The integrity of instrument tubing, with the exception of soldered fittings, is also expected to be maintained, though the accuracy of the instrument reading can be affected due to heating of the process fluid.	(a) MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.1 (p. 15) (b) MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.3(f) (p. 26) (c) MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.3(f) (p. 26) (d) MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.a, 3.2.2.1.7.4 (e) MCS-1465.00-00-0022, Rev. 2 Section 3.2.2.1.7.3 (p. 18)
B.2.2 Considerations for the Selection of Nuclear Safety Systems and Equipment. *Step 1: System Identification.* Based upon documentation of plant design, risk insights, and operation, plant systems required to achieve each of the nuclear safety criteria should be identified.	Step 1: MCS-1465.00-00-0022, Rev. 2 Section 3.3.2.1
Step 2: System Inter-Relationships. The selection of systems and the documentation of how these systems fulfill the nuclear safety performance criteria should be depicted in system-level logic diagrams, fault trees, or some other method that shows equipment dependencies. The documentation should consider not only the required process systems but also the essential mechanical/environmental support and essential electrical systems required to support the nuclear safety performance criteria.	Step 2: MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.3 (p. 25), App. B, C, D

NFPA 805 Appendix B Reference	Compliance Reference
Step 3: Equipment Identification. (a) P&IDs/flow diagrams should be used to identify the equipment in the flowpath and the boundary equipment within the systems that are required to achieve the nuclear safety objectives.	Step 3(a): MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.3(b) (p. 25), 3.2.3.2 (p. 23)
(b) Equipment that is not directly in a required system flowpath, but whose spurious operation (undesired operation) could prevent achieving the nuclear safety objectives should be identified (e.g., boundary valve component whose spurious opening could divert flow away from critical equipment). The potential for spurious operations of equipment should be considered when determining boundary valves and equipment selection. Loops or bypasses within a system where spurious operation would not result in a loss of flow or inadequate flow to nuclear safety success paths need not be considered. For tanks, all outlet lines should be considered for their functional requirements. For lines not required to be functional, a means of isolation should be included when necessary to prevent unnecessary drawdown of the tank. Tank fill lines should also be considered. For example, if two normally closed valves in series must spuriously open to result in an unrecoverable condition, then both valves should be identified on the nuclear safety equipment list (NSEL). If positive means is provided to preclude spurious operation of one valve/component for non-high low pressure interface component [such as removing power to one of the two motor-operated valves (MOVs) during normal operation], then consideration of the additional component (the other series valve) is not required.	Step 3(b): MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.a, c (p. 23, 24)

NFPA 805 Appendix B Reference	Compliance Reference
(c) Careful consideration should be given to equipment that could result in a fire-induced plant transient. The following is guidance on considerations that should be given in the identification of equipment that could result in a fire induced plant transient: (1) Fire-induced plant initiating events [transients and loss of coolant accidents (LOCAs)]. Transients are defined as anticipated operational occurrences (e.g., inadvertent safety injection actuation, loss of off-site power, over cooling, over filling of steam generators, spurious closure of containment isolation valves, significant loss of safety systems, station blackout, rapid cooldown, etc.) that initiate as a result of fire-induced circuit failures.	
(a) Loss of primary system inventory. The potential for fire initiated spurious actuation at reactor coolant pressure boundaries that could cause an uncontrolled loss of reactor coolant inventory [e.g., spurious actuation of primary coolant interfaces such as at the reactor head vents, normal and excess letdown at a pressurized water reactor (PWR), main steam relief valves (BWRs)] should be considered.	Step 3(c)(1)(a): MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.1.2, 3.2.3.1.3 (p. 21)
(b) Rapid cooldown. Transients that could result in an uncontrolled plant cooldown due to spurious operation of boundary valves should be considered. Interaction of plant systems such as steam generator (PWR) atmospheric dump valves, power-operated relief valves, safety relief valves (BWR) feedwater, reactor trip, turbine trip, and main steam isolation should be considered as well.	Step 3(c)(1)(b): MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.1.4 – Action item to update analysis to address how feedwater isolation is accomplished by procedure.
(c) Uncontrolled primary injection. Transients that could potentially result in an undesired or uncontrolled injection into the reactor coolant system should be assessed. This can include spurious actuation of high-pressure injection sources (i.e., HPCS, RCIC, HPCI, feedwater for BWRs, high-head ECCS pumps for PWRs).	Step 3(c)(1)(c): MCS-1465.00-00-0022, Rev. 2 – Not specifically mentioned. Addressed by procedure. Action item to address RPS cable concern.
(d) Electric power transients. Transients that could result in a loss of any ac power supplies should be considered. This loss can include spurious breaker actuations, onsite generating capability spurious starts or failures, or inadvertent paralleling of ac sources due to fire-induced circuit failures.	Step 3(c)(1)(d): MCS-1465.00-00-0022, Rev. 2 – for ASD fire areas, SSS alignment addressed by procedure (alignment of SSF power to MCC). For other fire areas, method of addressing this section is unclear.
(d) Equipment that requires support such as cooling water, instrument air, HVAC, motive, and control power should be considered in order to understand component and system inter-relationships and sequential equipment loss impact.	Step 3(c)(1)(b): MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.1.6 (p.22) – No credit taken for instrument air at McGuire.

NFPA 805 Appendix B Reference	Compliance Reference
(e) Off-site power can be used as a source of power for nuclear safety equipment. All equipment required to support the portion of off-site power relied upon to achieve the nuclear safety performance criteria should also be identified. Off-site power should conservatively be considered available for those cases where availability of off-site power could adversely impact nuclear safety (i.e., reliance cannot be placed on fire causing a loss of off-site power if the consequences of off-site power availability are more severe than its presumed loss). No credit should be taken for a fire causing a loss of off-site power to prevent spurious operations.	Step 3(c)(1)(e): MCS-1465.00-00-0022, Rev. 2 Section 3.2.2.1.5 (p. 15) – No specific credit taken for offsite power under current analysis.
(f) Instrument sensing lines should be considered for potential inaccurate instrument indications and/or spurious equipment actuations that could occur as a result of an instrument sensing line being exposed to a fire and increased temperatures. Any instrument sensing lines that could prevent the fulfillment of the nuclear safety performance criteria should be identified, associated with the equipment that it could impact, and included in the nuclear safety assessment for review on a fire area basis.	Action Item to look at SER 6. MCS-1465.00-00-0022, Rev. 2 - 3.2.2.1.7.3 (p. 23) NEI 00-01 Section 3.2.1.7 also has a similar step.
(g) Instrument air piping and components (e.g., accumulators) should be considered for viability during and after the fire in providing the motive force for credited components.	No credit taken for instrument air. Not listed in Section 3.2.3.1.6 of MCS-1465.00-00-0022, Rev. 2.
(h) Power supplies, including alternate power supplies, for nuclear safety equipment should be identified. Inter-relationships between power supplies (such as bus-tie capability and alternate power supplies) should also be identified. This information is essential in determining nuclear safety equipment losses due to loss of a power supply.	Section 3.2.3.1.6, Appendix B, C, D, E of MCS-1465.00-00-0022, Rev. 2
Step 4: Equipment Interrelationships. The necessary relationships between individual nuclear safety equipment and systems should be understood and documented.	Section 3.2.3.3 (p. 25) and Appendix B, C, D, E of MCS-1465.00-00-0022, Rev. 2
Step 5: Documentation. (a) The bases for selection and exclusion of nuclear safety systems and equipment should be documented and maintained. Calculations and analyses that have been previously performed in support of other nuclear safety objectives (i.e., station blackout, seismic qualification) can be utilized provided the results of these analyses have properly considered the applicability to post-fire nuclear safety.	MCS-1465.00-00-0022, Rev. 2
(b) To develop a nuclear safety equipment list (NSEL) in a consistent and reproducible manner, the following should be considered.	MCS-1465.00-00-0022, Rev. 2

NFPA 805 Appendix B Reference	Compliance Reference
(1) Valves/dampers constituting system boundaries should be included in the NSEL. Normally closed manual valves and properly oriented check valves credited as system boundaries are not required to be listed in the NSEL.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.a (p. 23) Consider adding dampers to the methodology that only mentions valves. Dampers are included on the safe shutdown logic diagrams.
(2) Manual drain, vent, and instrument root valves should not be included in the NSEL.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.b (p. 23)
(3) Valves/dampers in the flowpath whose spurious operation could adversely affect system operation should be included in the NSEL. Manual valves/dampers requiring repositioning during the post-fire shutdown should also be included. Manual valves/dampers/check valves that do not require recovery actions during the post-fire shutdown should not be included in the NSEL.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.c (p. 23)
(4) Safety/relief valves provided for equipment and piping protection should not be included. However, safety/relief valves providing an active nuclear safety function, such as the steam generator relief valves, are exceptions.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.d (p. 24)
(5) Pilot solenoid valves should be listed as separate components in the NSEL. The cabling associated with the solenoid valves should be listed either under the solenoid valve or the associated process valve (e.g., the air operated valve) as dictated by the project implementation procedure.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.2.i Does not agree. Inconsequential.
(6) Pumps, fans, turbines, tanks, heat exchangers, and other equipment should be included on the NSEL.	MCS-1465.00-00-0022, Rev. 2 Not specifically in methodology, but included on the SSEL.
(7) Instrumentation required for process monitoring of the nuclear safety systems should be identified.	MCS-1465.00-00-0022, Rev. 2 Section 3.2.3.1.5 (22), 3.2.3.2.a (p. 24)

E
NUCLEAR SAFETY TRANSITION – FIRE AREA ASSESSMENT TABLE

Fire Area	Elev.	Fire Area Description	Unit	SSD Trn	App. R Compliance Methods	Exemption / Deviation	Nuclear Safety Performance Criteria	Evaluations
1	AB, 695'	AUX BLDG COMMON	1&2	SSS	III.G.3	SER Supp. 5, Sections B-2.1.-9, B-5.4 SER 6 (manual actions) – Generic for SSS Lighting letters dated 11/18/83 and 2/20/84 - License Amendment 31 dated 4/16/84	The nuclear Safety Criteria are met as follows: ▪ **Reactivity control** – Rx. Trip and SBMUP from SFP (Tr. C), ▪ **Inventory and pressure control** – SBMUP from SFP (Tr. C), Rx. Head vents, tripping of RCPs (normal spray), PORVs isolated, letdown and excess letdown isolated, Charging pump via repair for inventory makeup during cooldown. ▪ **Decay heat removal** – TDAFP from CST or lake (passive) to 2 SGs, SG PORVs, Isolate MSIVs, SG PORVs, blowdown, A or B RHR system via repairs ▪ **Vital auxiliaries –** Nuclear Service Water, Component Cooling, and vital electrical support for transition to cold shutdown by repairs and manual actions (Tr. A or Tr. B) ▪ **Process monitoring** – Neutron flux (not committed), pressurizer level, all 4 SG level, all 4 SG pressure (local indication), RCS temperature and pressure (Tr. C), TDAFP flow, SBMUP discharge flow SER 6 Appendix C provides detail.	▪ III.G.3 Analysis (MCC-1435.03-0009), partial suppression/detection evaluations

Fire Area	Elev.	Fire Area Description	Unit	SSD Trn	App. R Compliance Methods	Exemption / Deviation	Nuclear Safety Performance Criteria	Evaluations
16	AB, 750'	TRAIN A PENETRATION RM	2	B	III.G.1	Grouped with Fire Area 18 for safe shutdown analysis purposes.	The nuclear Safety Criteria are met as follows: ▪ Reactivity control – Rx. Trip and Tr. B Charging from RWST ▪ Inventory and pressure control – Tr. B Charging from RWST, PORV isolation by operator actions, B train boundary valves available for isolation, Train B pressurizer heaters ▪ Decay heat removal – MDAFP 2B and Train B suction/flow paths from CST or lake (passive) to 2 SGs, TDAFP also available via manual action, SG PORVs, Isolate MSIVs (internal shorts cannot open valves), SG PORVs (internal shorts cannot open valves) blowdown, Train B RHR system ▪ Vital auxiliaries – Train B Nuclear Service Water, Component Cooling, and vital electrical support for transition to cold shutdown by repairs and manual actions (Tr. A or Tr. B) ▪ Process monitoring – Train B instrumentation available in control room.	▪ Fire Protection Safe Shutdown Review (Yellow book) – Rev. 2 – 1994 reference for

Fire Area	Elev.	Fire Area Description	Unit	SSD Trn	App. R Compliance Methods	Exemption / Deviation	Nuclear Safety Performance Criteria	Evaluations
18	AB, 750'	TRAIN A SWITCHGEAR RM	2	B	III.G.1	Outstanding issue (Finding - URI) - 50-369/03-07 AND 50-370/03-07 (RPS cables and detection) Grouped with Fire Area 16 for safe shutdown analysis purposes.	▪ The nuclear Safety Criteria are met as follows: ▪ ▪ Reactivity control – Rx. Trip and Tr. B Charging from RWST ▪ Inventory and pressure control – Tr. B Charging from RWST, PORV isolation by operator actions, B train boundary valves available for isolation, Train B pressurizer heaters ▪ Decay heat removal – MDAFP 2B and Train B suction/flow paths from CST or lake (passive) to 2 SGs, TDAFP also available via manual action, SG PORVs, Isolate MSIVs (internal shorts cannot open valves), SG PORVs (internal shorts cannot open valves) blowdown, Train B RHR system ▪ Vital auxiliaries – Train B Nuclear Service Water, Component Cooling, and vital electrical support for transition to cold shutdown by repairs and manual actions (Tr. A or Tr. B) ▪ Process monitoring – Train B instrumentation available in control room.	▪ Area credits manual operator actions, actions do not have prior NRC approval, manual actions have been evaluated (not clearly documented in a central evaluation)

F
SPECIFIC COMMENTS ON NEI 04-02 REVISION D

Section 1.4 – Relationship with Other Rules, Regulatory Guidance, Standards, and Programs

1) Ensure all documents listed in Section 1.4 are referenced in the document

Section 3.0 – Applicability

1) Change applicability statement to include plants licensed to operate after January 1, 1979.

Chapter 4

1) Generate three templates to address letter of intent, license amendment, and transition report.

2) Rewrite Chapter 4 to incorporate what was really done during the pilot project.

3) Add timeline discussion to Chapter 4 transition. Divide into 3 phases: 1) Submittal of "letter of intent" triggers completion of transition documentation, 2) Submittal of "License amendment" while NRC is reviewing, Licensee is completing transition documentation (completion of any outstanding analyses, procedure changes, and training), 3) Approval of License Amendment – "going live date"

Chapter 5

1) Look at the parts of Chapter 5 that could be eliminated. For example, sections 5.3 and 5.4.

Section 6.1.1 – Transition Process Overview

1) Paragraph 2 on page D-32 –add some detail about "validating" the quality of the exemptions/manual actions upon turnover.

2) Update Table 6-1 to more accurately reflect the chronological process and the inter-relation of 6.2.1 and 6.2.2 transition.

3) This section addresses mostly the transition of "Chapter 3 elements" – it really needs to deal with Chapter 4 transition also.

4) Revise bulleted list on page D-33 to match the updated Table 6-1.

Section 6.1.2 – Prior Approval Determination

1) Make sure that the discussion of Generic Letter 86-10 evaluations and Fire Protection Regulatory Reviews does not imply that the NRC has approved – but rather they are considered part of the licensing/design bases for purposes of the transition.

Section 6.2.1 – Fire Protection Fundamental Transition Review

1) Provide transition Table similar to Section 6.2.2

2) Update either section 6.2.1 and / or Appendix B-1 to provide more detail on how the transition was actually done during the pilot project.

Section 6.2.2 – Nuclear Safety Performance Criteria Transition Review

1) Improve table B-3 to provide more of a checklist of items associated with a fire area.

2) Additional Guidance should be provided to transition existing Alternative/Dedicated shutdown areas (allow grouping of similar fire areas).

3) Additional Guidance should be provided on the transition of Manual Actions (quality of documentation)

4) Additional Guidance should be provided on the transition of existing exemption/deviation requests (quality of documentation)

6.2.3 – Non-power Operational Modes Transition Review

1) See specific markups to wording:

- Page D-45 second paragraph – Revise as follows: "To demonstrate that the nuclear safety performance criteria are met for High Risk Evolutions (HREs as defined by NUMARC 91-06) during non-power operational modes, the following strategy is recommended"
- Page D-45 First Bullet – revise as follows "Review existing plant outage processes (outage management and outage risk assessments) to determine equipment relied upon to provide Key Safety Functions (KSF) including support functions."
- Page D-45 delete second bullet in its entirety – addressed in KFS discussion.
- Page D-46 First Bullet – revise as follows: "Identify locations where 1) fires may cause damage to the equipment (and cabling) credited above, or 2) recovery actions credited for the KFS are performed (for those KFSs that are achieved solely by recovery action i.e., alignment of gravity feed)."
- Page D-46 Second Bullet first sentence – revise as follows: "Identify fire areas where a single fire may damage all the credited paths for a KSF."
- Page D-46 Third Bullet modify as follows: "For those areas consider one or more of the following options to mitigate potential fire damage depending upon the significance of the potential damage:

  - Prohibition or limitation of hot work in fire areas during periods of increased vulnerability
  - Verification of operable detection and /or suppression in the vulnerable areas.
  - Prohibition or limitation of combustible materials in fire areas during periods of increased vulnerability
  - Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras) during increased vulnerability
  - Use of recovery actions to mitigate potential losses
  - Identification and monitoring insitu ignition sources for "fire precursers" (e.g., equipment temperatures)."

- Page D-46 Last paragraph of Section 6.2.3 modify as follows: "Appendix H provides examples of this process and the documentation requirements anticipated."

2) Include a definition of Modes that are actually being evaluated.

3) Appendix H – put together a table for transition.

6.2.4 – Radioactive Release Transition Review

1) No specific markups to wording

2) Appendix I – put together a checklist for transition

3) Page D-46 Last paragraph of Section 6.2.4 modify as follows: "Appendix I provides examples of this process and the documentation requirements anticipated."

6.3 – Engineering Analysis

1) This section provides no definitive guidance or insight into the "Transition Process". Suggest deleting it and moving the pertinent information in the last paragraph into the "documentation" of the results of the low power and radioactive release sections, and into the section 6.4.2

2) Appendix I – put together a checklist for transition

3) Page D-46 Last paragraph of Section 6.2.4 modify as follows: "Appendix I provides examples of this process and the documentation requirements anticipated."

Section 8.3 - Plant Change Evaluations

1) First paragraph – perhaps make clear that the conditions pertain to the new licensing basis (as well as old).

2) Page D-53. Top Paragraph, second sentence:

Consider rewording as follows: "The principle differences between the NFPA 805 change evaluation process and the traditional process is the consideration of risk and the ability to use performance-based approaches without prior NRC approval."

3) Pg. D-53, Last paragraph, last sentence; as continued on Pg. D-54:

   Prior NRC approval may still be necessary in some instances (Chapter 3 topics).

   "Technical Specifications" is not a good example of other regulatory processes.

4) Pg D-54, 3rd paragraph, 1st /2nd /3rd sentences: make consistent with what was discussed at pilot, perhaps: " The Change Evaluation process begins by defining the change from the baseline configuration as defined by the current licensing basis. An initial screen is performed to determine if a fundamental element(s) is being modified or if the deterministic criteria is not met. Deterministic criteria may be either the current licensing basis as transitioned or the deterministic criteria in NFPA 805. This screening process is similar to the fire protection regulatory review that is currently in place under traditional licensing bases."

5) Pg D-56 Flow chart. Need to fix to reflect discussions at Pilot.

   - Divide into screening, Integrated assessment
   - First diamond – Fundamental elements (as transitioned) met –(NO) into integrated, get NRC approval if CDF/LERF OK or upgrade. (YES) – next diamond
   - Second diamond – nuclear safety deterministic (as transitioned) met – YES – screens out NO – integrated assessment or upgrade
   - Add NEI Implementing Guide section numbers to boxes
   - Add risk element to fire modeling screening path (left branch of integrated analysis). This is the common denominator for acceptability.

6) Pg. D-57 – Divide discussion into screening and integrated assessment sections. Make reference to appendix example (To Be Provided)

Section 8.4.2. - Fire Modeling Considerations

1) First paragraph –state why would there be fire modeling. (Need generated by risk evaluations, risk sensitive areas, etc.)

2) Third paragraph – Revise to reflect Pilot. Input assumptions maintained in combustible control procedures and/or related documentation. Calculations should contain analyses with conclusions that are directly used by the procedure. Provide example procedure element in Appendix. (McGuire Supplement). Also, refer reader to Section 8.5.3 for monitoring considerations associated with fire modeling inputs.

8.5.3 - Monitoring Considerations

1) Pg. 86. First bulleted item – make reference to new appendix that will provide an example. (Example to be provided, McGuire Supplement).

2) First Pg 87 – Top of page. Add as an example of what may be monitored or controlled spatial separation from risk sensitive interactions, and limiting the size of specific fuel packages to prevent fire from causing remote damage.

3) Chapter 6 – follow rulemaking language for allowance of performance-based options in Chapter 3 – this would delete discussion regarding fundamental attributes, etc.

G
NUCLEAR SAFETY TRANSITION – FUNDAMENTAL ELEMENTS

NFPA 805 **Chapter 3 Fundamental Fire Protection** **Program and Design Elements**	**Utility Compliance Statement**	**Utility Current Licensing Basis Document Identification**
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.		
3.2 Fire Protection Plan. **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.	As an operational plant, the Vice President, Nuclear Generation Department has responsibility for implementing the fire protection program. He has delegated responsibility for implementation of the fire protection program to the Site Vice President, McGuire Nuclear Station. Within the station organization, responsibility for the fire protection program has been delegated through line management to the site Fire Protection Engineer. The Fire Protection Engineer will review the design, layout and installation of the fire detection and suppression systems as well as provide review, approval, guidance and support in the implementation of the program.	Design Basis Document MCS 1465.00.00-0008
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.	As an operational plant, the Vice President, Nuclear Generation Department has responsibility for implementing the fire protection program. He has delegated responsibility for implementation of the fire protection program to the Site Vice President, McGuire Nuclear Station. Within the station organization, responsibility for the fire protection program has been delegated through line management to the site Fire Protection Engineer. The Fire Protection Engineer will review the design, layout and installation of the fire detection and suppression systems as well as provide review, approval, guidance and support in the implementation of the program.	Design Basis Document MCS 1465.00.00-0008
3.2.2.1* The policy document shall designate the senior management position with immediate authority and responsibility for the fire protection program.	As an operational plant, the Vice President, Nuclear Generation Department has responsibility for implementing the fire protection program. He has delegated responsibility for implementation of the fire protection program to the Site Vice President, McGuire Nuclear Station. Within the station organization, responsibility for the fire protection program has been delegated through line management to the site Fire Protection Engineer. The Fire Protection Engineer will review the design, layout and installation of the fire detection and suppression systems as well as provide review, approval, guidance and support in the implementation of the program.	Design Basis Document MCS 1465.00.00-0008
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.	As an operational plant, the Vice President, Nuclear Generation Department has responsibility for implementing the fire protection program. He has delegated responsibility for implementation of the fire protection program to the Site Vice President, McGuire Nuclear Station. Within the station organization, responsibility for the fire protection program has been delegated through line management to the site Fire Protection Engineer. The Fire Protection Engineer will review the design, layout and installation of the fire detection and suppression systems as well as provide review, approval, guidance and support in the implementation of the program.	Design Basis Document MCS 1465.00.00-0008

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements	Utility Compliance Statement	Utility Current Licensing Basis Document Identification
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.	As an operational plant, the Vice President, Nuclear Generation Department has responsibility for implementing the fire protection program. He has delegated responsibility for implementation of the fire protection program to the Site Vice President, McGuire Nuclear Station. Within the station organization, responsibility for the fire protection program has been delegated through line management to the site Fire Protection Engineer. The Fire Protection Engineer will review the design, layout and installation of the fire detection and suppression systems as well as provide review, approval, guidance and support in the implementation of the program.	Design Basis Document MCS 1465.00.00-0008
3.2.2.4* The policy document shall identify the appropriate AHJ for the various areas of the fire protection program.	As an operational plant, the Vice President, Nuclear Generation Department has responsibility for implementing the fire protection program. He has delegated responsibility for implementation of the fire protection program to the Site Vice President, McGuire Nuclear Station. Within the station organization, responsibility for the fire protection program has been delegated through line management to the site Fire Protection Engineer. The Fire Protection Engineer will review the design, layout and installation of the fire detection and suppression systems as well as provide review, approval, guidance and support in the implementation of the program.	Design Basis Document MCS 1465.00.00-0008
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: (1)* Inspection, testing, and maintenance for fire protection systems and features credited by the fire protection program (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)* Reviews of fire protection program — related performance and trends (4) Reviews of physical plant modifications and procedure changes for impact on the fire protection program (5) Long-term maintenance and configuration of the fire protection program (6) Emergency response procedures for the plant industrial fire brigade		SLC-16.9.1, Fire Suppression Water System, SLC-16.9.2, Spray and/or Sprinkler Systems, SLC-16.9.3, Halon Systems, SLC-16.9.4, Fire Hose Stations, SLC-16.9.5, Fire Rated Assemblies, SLC-16.9.6, Fire Detection Quality Assurance, NEIL, Triennial Inspections, McGuire Trending and McGuire Fire Protection Performance Indicator NSD-301, Nuclear Station Modifications Maintenance Rule (Barriers, Pumps, Doors), Inspection Procedures. NSD-112, Fire Brigade Organization, Training and Responsibilities Station Fire Strategies for all buildings.
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: (1) Prevention of fires and fire spread by controls on operational activities (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.	Nuclear System Directive NSD-313, Control of Combustible and Flammable Material, prohibits bulk storage of combustible materials inside or adjacent to safety related buildings or systems. Periodic inspections by insurance representatives, the Fire Protection Engineer and station personnel will assure adherence to the Directive. Station Directives and procedures require control of combustible material required for operation of the plant. Requirements by the insurance inspectors and station directives permit fire retardant treated wood use in the station only when suitable non-combustible substitutes are not available. The periodic inspections by insurance personnel, the Fire Protection Engineer, as well as station personnel, assure compliance with the Directive.	DBD Section B.2 DBD Section B.3.c

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements	Utility Compliance Statement	Utility Current Licensing Basis Document Identification
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.	All work requests are planned either by the McGuire Planning Section or Work Control Center. The effects of maintenance or modification activities on station fire barriers are considered in the planning process. Additionally maintenance supervisors are required to take special precautions when fire barriers or equipment are degraded. NSD-314, Hot Work Authorization, provides guidance for precautions taken during welding and cutting operations.	DBD Section B.3.a
3.3.1.1 General Fire Prevention Activities. The fire prevention activities shall include but not be limited to the following program elements:		
(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	General Employee Training (GET) provides familiarization with plant fire protection procedures, fire reporting and plant emergency alarms.	DBD Section B.2
(2) * Documented plant inspections including provisions for corrective actions for conditions where unanalyzed fire hazards are identified	Periodic inspections by insurance representatives, the Fire Protection Engineer and station personnel will assure adherence to Directive NSD-313. Plant Investigation Process (PIP) for providing provisions for corrective actions for conditions where unanalyzed fire hazards are identified.	DBD Section B.3.a
(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	All work requests are planned either by the McGuire Planning Section or Work Control Center. The effects of maintenance or modification activities on station fire barriers are considered in the planning process. Additionally maintenance supervisors are required to take special precautions when fire barriers or equipment are degraded. NSD-314, Hot Work Authorization, provides guidance for precautions taken during welding and cutting operations	NSD-313 Control of Combustible and Flammable Material. NSD-314, Hot Work Authorization NSD-316, Fire Protection Impairment and Surveillance NSD-301, Nuclear Station Modifications
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:	Procedures for the control of general housekeeping and the control of transient combustibles are contained in NSD-313, Control of Combustible and Flammable Material.	NSD-313, Section 3.1.3.6.1.1 Ordinary Combustibles.
(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.*		NSD-313, Section 313.6.1 specifies only fire resistant Griffolyn plastic can be used within power production and safe shutdown areas.
(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.		NSD-313, Section 313.6.2 In-Use Material.
(3) Waste, debris, scrap, packing materials, or other combustibles shall be removed from an area immediately following the completion of work or at the end of the shift, whichever comes first.		NSD-313, Section 313.6.2 In-Use Material.
(4)* Combustible storage or staging areas shall be designated, and limits shall be established on the types and quantities of stored materials.		NSD-313, Section 313.6.1.2 Flammable/Combustible Liquids.
(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.		NSD-313, Section 313.6.1.3 Oxidizers and NSD-313, Section 313.6.1.4 Compressed Gas Cylinders.
(6)* Controls on use and storage of flammable gases shall be in accordance with applicable NFPA standards.		

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3.3.1.3 Control of Ignition Sources. **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.	McGuire presently does not reference NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations. Incorporation into NSD-314 will be considered during the next revision. Equipment will be stored in an area protected by sprinklers. Local hose stations and portable extinguishers will be provided as backup. NSD-314, Hot Work Authorization, requires permits for all uses of this equipment outside designated shop areas. NDS-314 references NFPA 51B.	DBD Section G.1
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.	NSD - 104, Material Condition/Housekeeping, Cleanliness/Foreign Material Exclusion and Seismic Concerns. Section 104.2.2.1 restricts smoking to properly designated areas. NSD - 314, Hot Work Authorization provides guidance relative to other ignition sources .	
3.3.1.3.3 Open flames or combustion-generated smoke shall not be permitted for leak or air flow testing.	Leak testing and similar procedures such as air flow determinations are accomplished with available aerosol techniques. Open flame or combustion generated smoke will not be used for leak testing. Periodic test procedures, written by experienced personnel, cover steps in testing for each situation. Supervisors and maintenance personnel are experienced in their areas of responsibility.	DBD Section B.3.b
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 equipment important to nuclear safety or where there is a potential for radiological releases resulting from a fire.	Plant administrative procedures control the use of portable electrical heaters. Portable fuel-fired heaters are not be permitted in plant areas containing equipment important to nuclear safety or where there is a potential for radiological releases resulting from a fire.	NDS 316
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.	Wall, floors and components that maintain structural stability are non combustible construction. Dry wall fire walls use metal studs.	DBD Section D.1.d
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.	Interior finishes have flame spread of 25 or less and smoke and fuel contribution of 50 or less in its use configuration.	DBD Section D.1.d
3.3.4 Insulation Materials. Thermal insulation materials, radiation shielding materials, ventilation duct materials, and soundproofing materials shall be noncombustible or limited combustible.	Interior wall and structural components, thermal insulation materials and radiation shielding materials and sound proofing have a flame spread rating of 25 or less, as tested in accordance with ASTM E-84.	DBD Section D.1.d

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3.3.5 Electrical. **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.	Only those cables required for operation are routed to the Control Room. Cable entering the Control Room terminates there. There are no floor trenches or culverts in the Control Room. Cables run in the ceiling are for computers, power and control of HVAC and lighting and equipment located in the ceiling space. Computer cables are a plenum rated type or are routed inside conduit. There are three shielded pair cables and two coaxial cables routed above the ceiling which are used for testing and communication during outages. They are normally de-energized and during use, supply low voltage signals. (PIP 0-M93-1230) March 22, 1978 -- W.O. Parker to NRC -- Response to Request for Additional Information on Fire Protection (January 17, 1978) - There are no locations where suspended ceilings conceal safety related systems, components, equipment or cables.	DBD Section D.3.j Duke to NRC Correspondence
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.	All cable trays are constructed of galvanized steel.	DBD Section D.3.a
3.3.5.3* Electric cable construction shall comply with a flame propagation test as acceptable to the AHJ. *Exception: Existing cable in place prior to the adoption of this standard shall be permitted to remain as is.*	The cable used at McGuire, classified as either power, control or instrumentation, passes the IEEE No. 383-1975 Flame Test. The 5KV and 8KV cables are three conductor power cables. The tinned copper conductors are covered with a semi-conductive extruded strand shield, insulated with ethylene propylene rubber (EPR) and wrapped with a tinned copper shield tape. The three conductors are then twisted with a non-hygroscopic filler, bound together with binders tape, encased in a 25 mil galvanized steel interlocked armor jacket and covered with a polyvinyl chloride (PVC) jacket. (See Figure 1) The three conductor 2KV power cable, which is used for 600 V systems, is constructed the same as the 8-5KV cable except that a hypalon or neoprene jacket has been applied over the EPR insulation in lieu of the tinned copper shield tape.	DBD Section D.3.f
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.	Metal deck roof construction is listed as Class I by Factory Mutual System Approval Guide or Class A by Underwriters' Laboratories.	DBD Section D.1.e
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.	Bulk compress or cryogenic flammable gas storage is not located inside structures housing systems, equipment, or components important to nuclear safety.	

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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.	Flammable gas is stored outdoors such that an explosion will not adversely impact systems, equipment, or components important to nuclear safety. MC-1003-1, Plot Plan identifies the location of the hydrogen storage house.	
3.3.7.2 Outdoor high-pressure flammable gas storage containers shall be located so that the long axis is not pointed at buildings.	Bulk hydrogen gas storage is located in a separate detached building. Orientation of the tanks has been reviewed and conclusions made in Evaluation Report No. 83-09, Rev. 3 that a tank failure which propels a portion of the tank towards the plant buildings will not compromise the ability of the plant to safely shutdown.	DBD Section D.2.b
3.3.7.3 Flammable gas storage cylinders not required for normal operation shall be isolated from the system.	NSD – 313, Control of Combustibles and Flammable Material requires that flammable gas storage cylinders not in use shall have the protective caps installed hand tight. OP/0/B/6450/007 – Hydrogen Bulk Storage System procedure permits only one hydrogen cylinder to be in service, all other cylinders are isolated.	
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.	Nuclear System Directive NSD-313, Control of Combustible and Flammable Materials, requires storage of flammable liquids to, as a minimum, comply with NFPA 30, "Flammable and Combustible Liquids Code". Nuclear System Directive NSD-313, Control of Combustible and Flammable Material, prohibits bulk storage of combustible materials inside or adjacent to safety related buildings or systems. Periodic inspections by insurance representatives, the Fire Protection Engineer and station personnel will assure adherence to the Directive. The main bulk of fuel oil for the standby shutdown facility diesel generator and the emergency diesel generators is stored in underground tanks that are vented to atmosphere. Smaller quantities of fuel oil for these diesels are stored indoors in day tanks which are supplied by underground storage tanks. The emergency diesel generator day tanks and the SSF diesel day tank are filled by transfer pumps. The day tanks are located on the lowest floor of their respective buildings. The capacity of each emergency diesel day tank is 275 gal. The day tanks are vented to atmosphere with lines of adequate size. They do not terminate outside, but are equipped with flame arrestors. The standby shutdown facility day tank has a level glass mounted on the outside and is provided with a dike to contain spilled oil. With the exceptions outlined above, the fuel oil storage tanks meet the requirements of NFPA Standard 31 for oil burning equipment - tank storage.	NSD – 313 DBD Section B.2 DBD Section D.2.d
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.	Curbed area around outdoor Transformers is piped to a settling pond. The status of the drainage system would be observed after a heavy rain or during the transformer deluge testing and any observed blockage would be identified and resolved. McGuire to consider adding a requirement to the deluge system test to inspect for blockage.	

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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.	NSD – 104, Material Condition/Housekeeping, Cleanliness/Foreign Material Exclusion and Seismic Concerns addresses general housekeeping and material condition of plant equipment expectations.	
3.3.11 Electrical Equipment Adequate clearance, free of combustible material, shall be maintained around energized electrical equipment.	NSD – 104, Material Condition/Housekeeping, Cleanliness/Foreign Material Exclusion and Seismic Concerns addresses general housekeeping.	
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 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. (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. (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) A flame arrestor is required in the vent if the flash point characteristics of the oil present the hazard of a fire flashback. (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. (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.	The oil collection system for each reactor coolant pump is capable of collecting lubricating oil from all potential pressurized and nonpressurized leakage sites. Leakage is collected and drained to a vented closed container that can hold the inventory of the reactor coolant pump lubricating oil. A flame arrestor is provided on the storage tank. Leakage points include the lift pump, piping overflow lines, oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines and oil reservoirs where such features are present. The collection basin drain line is sufficiently sized to preclude overflowing the basin.	

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3.4 Industrial Fire Brigade. **3.4.1 On-Site Fire-Fighting Capability.** All of the following requirements shall apply. (a) A fully staffed, trained, and equipped fire-fighting force shall be available at all times to 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: (1) NFPA 600, Standard on Industrial Fire Brigades (interior structural fire fighting) (2) NFPA 1500, Standard on Fire Department Occupational Safety and Health Program (3) NFPA 1582, Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians (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. (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.* (d)* The industrial fire brigade shall be notified immediately upon verification of a fire. (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 fire-fighting operations. The physical examination shall determine the ability of each member to use respiratory protection equipment.	McGuire has a minimum 5 person fire brigade for each shift. The fire brigade organization has been previously approved. Fire brigade members do not have other responsibilities that supercede fire brigade responsibility. The fire brigade leader and at least 2 fire brigade members have reactor operator licenses. It is normal practice to notify fire brigade members upon verification of a fire in the plant. Each industrial fire brigade member has an annual physical examination to determine that he or she can perform the strenuous activity required during manual fire-fighting operations. The physical examination includes the ability of each member to use respiratory protection equipment.	 OMP 5-8 RP 25 SCBA - Fire Protection T&Q Topic 11, HSO 113 Physical Qualification – Fire Protection T&Q section 6.7
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.	Current and detailed pre-fire plans are available to the fire brigade for all areas in which a fire could jeopardize the ability to meet the nuclear safety performance criteria.	NSD 112
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.	The pre fire plans detail the fire area configuration and fire hazards to be encountered in the fire area, along with nuclear safety components and fire protection systems and features that are present.	
3.4.2.2 Pre-fire plans shall be reviewed and updated as necessary.	Pre-fire plans are reviewed and updated as necessary.	
3.4.2.3* Pre-fire plans shall be available in the control room and made available to the plant industrial fire brigade.	Pre-fire plans are available in the control room and in the fire brigade equipment storage locations. .	
3.4.2.4* Pre-fire plans shall address coordination with other plant groups during fire emergencies.	Pre-fire plans address coordination with other plant groups during fire emergencies.	

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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. (a) Plant Industrial Fire Brigade Training. All of the following requirements shall apply.		
(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.	The fire brigade training and refresher training is conducted in accordance with guidelines from the National Fire Protection Association.	DBD Section B.5.b
(2) Industrial fire brigade members shall be 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.	The Nuclear System Directive NSD-112, Fire Brigade Organization, Training and Responsibilities, covers the training and organization of the fire brigade.	DBD Section B.5.b
(3) A written program shall detail the industrial fire brigade training program.	The Nuclear System Directive NSD-112, Fire Brigade Organization, Training and Responsibilities, covers the training and organization of the fire brigade.	DBD Section B.5.b
(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.		
(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.	Personnel who may respond with the fire brigade, such as radiation protection personnel are trained for their specific responsibility.	Emergency plan
(c) * *Drills*. All of the following requirements shall apply.		
(1) Drills shall be conducted quarterly for each shift to test the response capability of the industrial fire brigade.	Drills are conducted quarterly with a grace period not to exceed 112 days.	Emergency Plan
(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 extinguish the fire and smoke conditions being simulated by the drill scenario.	Fire brigade drills test and challenge the 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 critique the industrial fire brigade's abilities to react, respond, and demonstrate proper fire-fighting techniques to control and extinguish the fire and smoke conditions being simulated by the drill scenario.	
(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.	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.	
(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.	Drill records are maintained detailing the drill scenario, industrial fire brigade member response, and ability of the industrial fire brigade to perform as a team.	
(5) A critique shall be held and documented after each drill.	A critique is conducted and documented after each drill.	

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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.	Protective clothing, respiratory protective equipment, radiation monitoring equipment, personal dosimeters, and fire suppression equipment such as hoses, nozzles, fire extinguishers, and other needed equipment are provided for the fire brigade. This equipment conform with the applicable NFPA standards.	
3.4.5 Off-Site Fire Department Interface. **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.	A mutual aid agreement is established with the local volunteer fire department.	
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.	Fire fighters from the off-site fire authorities who are expected to respond to a fire at the plant are offered site-specific training and are invited to participate in a drill at least annually	
3.4.5.3* Security and Radiation Protection. Plant security and radiation protection plans shall address off-site fire authority response.	Security and radiation protection personnel are prepared to respond to the occasion when the off site fire department is summoned to the site under the mutual aid agreement.	
3.4.6* Communications. An effective emergency communications capability shall be provided for the industrial fire brigade.	The fire brigade has a dedicated radio system.	
3.5 Water Supply. **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.	The water supply for the fire protection system is Lake Norman with a capacity well in excess of 600,000 gallons. McGuire fire pumping capability consists of three pumps rated at 2,500 gpm at 125 psi. The fire pump capacity meets the demand of the largest water suppression system plus hose flow demand.	

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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.*	N/A McGuire does not use water storage tanks for the supply of the fire protection system. McGuire fire protection water supply is derived from Lake Norman. Three fire pumps are located in the Intake Structure where each suction point and pump is adequately separated. Each fire pump uses its own bay for water supply.	
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.	The water supply is provided by three full capacity 2500 gpm at 125 psig electric motor driven fire pumps supplied with water from Lake Norman. Each pump can meet the maximum demand of 1750 gpm for sprinklers and deluge systems, plus 750 gpm for hose streams. The set pressures at which the pumps are activated are staggered. The fire pumps operate until the fire has been extinguished and can only be shut off manually. The Fire Protection System is designed to meet the standards developed by the National Fire Protection Association (NFPA 20, 1978) where practicable and suggestions, practices, and standards defined in the Nuclear Mutual Limited Property Loss Prevention Standards for Nuclear Generating Stations. In addition, the design of the system will be in accordance with the Nuclear Regulatory Commission's 10CFR50 Appendix A, Criterion 3. Exceptions to specific recommendations in the NFPA 20 code are noted in letter of March 22, 1985. I & E Inspection Report No.50-369/80-11 and 50-370/80-07 dated June 17, 1980 notes acceptance of the fire pump installations. Clarification of deviations to NFPA 20 is provided in MCC-1435.03-00-0013. Each fire pump is driven by a 300 HP motor. The three fire pumps are powered from diverse power supplies: 1. Power to Fire Pump “A” is from 6.9KV Switchgear 2TB, i.e., from the Unit 2 auxiliary system backed by the 525KV switchyard, 2. Power to Fire Pump “B” is from 6.9KV Switchgear 1TD, i.e., from the Unit 1 auxiliary system backed by the 230KV switchyard, and 3. Power to Fire Pump “C” is from the McGuire Fire Pump Substation 44/12.47/480VAC Pad Mount Transformer, i.e., from an independent 44KV line from Riverbend Steam Station.	DBD Section E.2.c

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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.	The water supply is provided by three full capacity 2500 gpm at 125 psig electric motor driven fire pumps supplied with water from Lake Norman. Each pump can meet the maximum demand of 1750 gpm for sprinklers and deluge systems, plus 750 gpm for hose streams. The set pressures at which the pumps are activated are staggered. The fire pumps operate until the fire has been extinguished and can only be shut off manually. Exceptions to specific recommendations in the NFPA 20 code are noted in letter of March 22, 1985. I & E Inspection Report No.50-369/80-11 and 50-370/80-07 dated June 17, 1980 notes acceptance of the fire pump installations. Clarification of deviations to NFPA 20 is provided in MCC-1435.03-00-0013. The three fire pumps are powered from diverse power supplies: 4. Power to Fire Pump "A" is from 6.9KV Switchgear 2TB, i.e., from the Unit 2 auxiliary system backed by the 525KV switchyard, 5. Power to Fire Pump "B" is from 6.9KV Switchgear 1TD, i.e., from the Unit 1 auxiliary system backed by the 230KV switchyard, and 6. Power to Fire Pump "C" is from the McGuire Fire Pump Substation 44/12.47/480VAC Pad Mount Transformer, i.e., from an independent 44KV line from Riverbend Steam Station.	DBD Section E.2.c
3.5.5 Each pump and its driver and controls shall be separated from the remaining fire pumps and from the rest of the plant by rated fire barriers.	Fire Pump A is separated from Pumps B and C by the width of the intake structure (approximately 250 feet).	DBD Section E.2.c
3.5.6 Fire pumps shall be provided with automatic start and manual stop only.	The set pressures at which the pumps are activated are staggered. The fire pumps operate until the fire has been extinguished and can only be shut off manually. A redundant starting scheme is utilized for the three main fire pumps. If a fire occurs, the drop in line pressure caused by sprinkler, deluge system or hose operation actuates a set of pressure switches. The set points are staggered so that if the first pump set to start fails, the second pump automatically starts. If the second pump also fails, the third pump operates. A manual start pushbutton for each pump is provided in the Control Room for further redundancy.	
3.5.7 Individual fire pump connections to the yard fire main loop shall be provided and separated with sectionalizing valves between connections.	Post indicator valves are arranged to provide isolation of portions of the main loop for maintenance or repair without shutting off the complete system. Post Indicator Valves are provided on either side of the fire main loop where the fire pump connections intersects.	DBD Section E.2.a MCFD-1599 Series P&ID's
3.5.8 A method of automatic pressure maintenance of the fire protection water system shall be provided independent of the fire pumps.	Two full capacity 200 gpm at 125 psig jockey pumps are provided to prevent frequent starting of the fire pumps by maintaining pressure in the yard mains. These pumps maintain the system pressure above the set point pressures of the fire pumps by replenishing any water lost from leakage in fire mains or approved usage. A 5000 gallon pressurizer tank is provided in the system to act as an accumulator or surge tank for the jockey pumps. The tank has an air volume in the top of the tank which expands or contracts with pressure fluctuations in the fire protection system.	DBD Section E.2.c

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3.5.9 Means shall be provided to immediately notify the control room, or other suitable constantly attended location, of operation of fire pumps.	Annunciation alarms are provided in the Control Room to indicate control power failure or failure to start and computer alarms for each pump indicate that a pump is running or that a pump has failed to start.	DBD Section E.2.c
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.	An underground fire loop (16" cement-lined ductile iron) is provided around the perimeter of the plant site as shown on drawing MC-1518-25.85.00. Specification MCS 1206.00-02-002 requires that Category QA 3 piping be installed in accordance to the applicable NFPA standards.	DBD Section E.2.a
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 and backup fire suppression systems.	Post indicator valves are arranged to provide isolation of portions of the main loop for maintenance or repair without shutting off the complete system. A single failure in the fire suppression system will not impair both the primary and backup fire suppression capability. Note that the Pipe Corridor and Lower Containment in the Reactor Buildings, have automatic sprinklers and hose stations supplied by a single piping system. These areas are not accessible during unit operation. This arrangement has been accepted by the NRR in memo dated January 8, 1981. In other areas separate feeders from the fire protection header to fixed sprinkler systems and back-up hose stations will assure available fire protection. Each sprinkler system and manual hose station has an independent connection to the fire protection feeder; therefore, a single failure cannot impair both the primary and backup fire protection systems. (See Section A.4)	DBD Section E.2.a DBD Section A.4 DBD Section E.3.a
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.*	Threads are compatible with the local fire department.	
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.	N/A – McGuire is licensed using BTP 9.5-1, Appendix A which does not require seismically designed standpipe systems. Therefore, this requirement is not applicable to McGuire since this plant was approved without seismically designed standpipes.	

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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. (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.	Fire Protection Water Supply and Fire Suppression control valves are either electrically supervised or locked in their normal position.	DBD Section E.3.b
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.*	Hydrants are located such that, with equipment provided for the fire brigade, any location within the security boundary can be reached with an effective hose stream. Post indicator valves are provided to isolate sections of the fire loop for maintenance or repairs. Hose houses are equipped with hose nozzles and other auxiliary equipment recommended in NFPA 24, "Outside Protection".	DBD Section E.2.g
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 determined in this section.*	In general, the McGuire fire protection water supply system is dedicated to fire protection use only. There are two exceptions. The fire protection water supply system also supplies back-up water supply to the Low Level Intake Pump Bearing and RC Pump Bearing which is in compliance with the Exception No. 1 described in NFPA 805, Section 3.5.16. The fire protection water supply system also supplies water to the Waste Treatment Pond. This supply does not comply with NFPA 805, Section 3.5.16, Exception No. 1 & 2. However, the Waste Treatment Pond demand is less than 20 gallons per minute and this demand is intermittent and not a continuous demand. The fire protection water supply system consists of three 2500 gpm pumps deriving water supply from Lake Norman. The 20 gpm demand from the Waste Treatment Pond is negligible in light of the overall capacity of the Fire Protection Water Supply System.	
3.6 Standpipe and Hose Stations. **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.	SER 5-B-2.1-8 -- Manual hose stations are located throughout the plant to ensure that an effective hose stream can be directed to any safety related area in the plant. These systems are consistent with the requirements of NFPA Standard No. 14, "Standpipe and Hose System for Sizing, Spacing, and Pipe Support Requirements." Fire hose stations in Seismic category 1 structures are Class III hose stations.	DBD Section E.3

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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.	SER 5-B-2.1-8 -- Manual hose stations are located throughout the plant to ensure that an effective hose stream can be directed to any safety related area in the plant. These systems are consistent with the requirements of NFPA Standard No. 14, "Standpipe and Hose System for Sizing, Spacing, and Pipe Support Requirements."	DBD Section E.3.e
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 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.	Hoses are provided with proper nozzles for fighting fires in the geographical area. In addition, fire brigade training emphasizes the proper techniques for fighting the different type fires.	
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). Exception*: For existing plants that are not capable of meeting this requirement, provisions to restore a water supply and distribution system for manual fire-fighting purposes shall be made. This provisional manual fire-fighting standpipe/hose station system shall be capable of providing manual fire-fighting protection to the various plant locations important to supporting and maintaining the nuclear safety function. The provisions for establishing this provisional system shall be preplanned and be capable of being implemented in a timely manner following an SSE.*	McGuire construction permit was issues on February 28, 1973. The Branch Technical Position APCSB 9.5-1 does not require seismic standpipes for plants for which construction permits were issued prior to July 1, 1976.	
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.	Fire protection system water distribution system is not cross connected to non fire protection water supply systems.	
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.	Portable extinguishers are provided in accordance with guidelines of NFPA Standards.	DBD, Section E.6

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3.8 Fire Alarm and Detection Systems. **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: (1) Actuation of any fire detection device (2) Actuation of any fixed fire suppression system (3) Actuation of any manual fire alarm station (4) Starting of any fire pump (5) Actuation of any fire protection supervisory device (6) Indication of alarm system trouble condition	The Fire Detection System complies with the intent of NFPA 72D, 1975. It is a “Class B” supervised system which provides alarm and trouble indication to the Control Room operator from all detectors and tested by operating personnel to insure system integrity. Battery backed inverter power is provided for emergency operation with alarm indication in the Control Room if normal power is lost. While the Fire Detection System design complies with the intent of NFPA 72D, 1975, specific features of the McGuire Nuclear Station design may differ in certain areas. Clarification of these areas is provided in Calculation MCC-1435.03-00-0013. Activation of any detector gives a local alarm on the elevation of the activation as well as an audible and visual alarm in the Control Room May 15, 1989 -- NRC to Duke- NRC accepts 2 deviations from NFPA 72D "Proprietary Protective Signaling Systems" to the extent that it requires the fire alarm systems to be monitored for component failures and to take precedent over all other signals. ▪ The criteria used for spacing detectors throughout the plant are those recommendations presented in NFPA 72E-1974, “Standard on Automatic Fire Detectors.” Further guidance on spacing and locating detectors was obtained from Appendix A and Appendix B of NFPA 72E-1974. ▪ Item 30 - Duke's position with regard to the National Electric Code (NFPA 70) as referenced in NFPA 72D-1975 paragraphs 2110, 2213, and 2321 and as pertains to the design of fire alarm systems is discussed.	DBD Section E.1.a DBD Section E.1.b
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.	General Employee Training instructs all station employees to call the Control Room upon detection of a fire. Contacting the control room can be accomplished by the plant paging system or by telephone.	
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: (1) General site population in all occupied areas (2) Members of the industrial fire brigade and other groups supporting fire emergency response (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.	The Plant paging system is used to notify plant personnel of a fire Members of the station fire brigade also have fire brigade radios. Offsite emergency response organizations are notified in accordance with the existing mutual aid agreement. Capability exists to notify the off-site fire emergency response agencies by either a land line or satellite phone.	
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.	The Code of Record for McGuire relative to detection systems is NFPA 72D and 72E, 1974 edition. Detection systems have been reviewed for compliance with these documents and any deviations have been addressed in MCC-1435.03-00-0013.	

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3.9 Automatic and Manual Water-Based Fire Suppression Systems. **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: (1) NFPA 13, Standard for the Installation of Sprinkler Systems (2) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection (3) NFPA 750, Standard on Water Mist Fire Protection Systems (4) NFPA 16, Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.	Regulatory required systems are defined by Chapter 4 requirements: Start with Ref SLC 16.9.2, Table 16.9.2.-1 and ADD code of reference (Need list from Chapter 4 for section 3.9 requirements)	
3.9.2 Each system shall be equipped with a water flow alarm.	Sprinkler systems in the Auxiliary and Reactor Buildings are equipped with water flow alarms.	This issue is addressed in correspondence of August 1, 1978 from W.O. Parker, Item 39.
3.9.3 All alarms from fire suppression systems shall annunciate in the control room or other suitable constantly attended location.	Alarms from fire suppression systems annunciate in the control room	The existing Fire Protection Review (DBD) does not address this issue. However, the existing fire suppression system alarms satisfy this requirement .
3.9.4 Diesel-driven fire pumps shall be protected by automatic sprinklers.	Not Applicable: There are no diesel engine driven fire pumps at McGuire	
3.9.5 Each system shall be equipped with an OS&Y gate valve or other approved shutoff valve.	Control valves are indicating type gate valves except for Reactor Building sprinkler systems, reactor coolant pumps and pipe corridor are not indicating type valves. These valves are seismically qualified. UL/FM does not list/approve seismically qualified valves.	Correspondence from H. B. Tucker's April 14, 1983 letter to J. P. O'Reilly.
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.	Fire protection system valves in the direct flow path controlling water supplies to fixed automatic and manual suppression systems which are not electrically supervised, with indication to the Control Room, will be locked or sealed in normal operating position and checked periodically to assure fire protection is available.	DBD Section E.3.b
3.10 Gaseous Fire Suppression Systems. **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: (1) NFPA 12, Standard on Carbon Dioxide Extinguishing Systems (2) NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems (3) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems	A Halon 1301 suppression system is available for the Auxiliary Feedwater Pumps (Steam Driven) and also for the Diesel Generators. Clarification of deviations to NFPA 12A is provided in MCC 1435.03 00-0013. The system is approved and tests are performed to assure proper concentrations are achieved in each area to prevent the spread of fire. Periodic testing requirements are included to verify the availability of the Halon systems	DBD Section E.4
3.10.2 Operation of gaseous fire suppression systems shall annunciate and alarm in the control room or other constantly attended location identified.	Alarms from fire suppression systems annunciate in the control room.	The existing Fire Protection Review (DBD) does not address this issue. However, the existing fire suppression system alarms satisfy this requirement.

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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.	The Halon systems are 7% concentration by volume. The initial acceptance discharge test demonstrated that over pressurization is not possible and that, sealing is adequate to prevent excessive loss of agent. The diesel generator rooms and Turbine Driven Auxiliary Feedwater Pump rooms do not present a potential for release of radioactive contaminates.	MP\0\A\4650\04 inspection procedures for fire barriers
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.	Halon fire suppression systems in Diesel Generator Rooms and Turbine Driven Auxiliary Feedwater Pump Rooms are considered primary fire suppression. Back up fire suppression in these locations is provided by fire hose stations.	
3.10.5 Provisions for locally disarming automatic gaseous suppression systems shall be secured and under strict administrative control.	Provisions for locally disarming the Halon System are controlled by Plant Work Control Process.	
3.10.6* Total flooding carbon dioxide systems shall not be used in normally occupied areas.	N\A: Total flooding carbon dioxide fire suppression systems are not used at McGuire	
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.	N\A: Total flooding carbon dioxide fire suppression systems are not used at McGuire	
3.10.8 Positive mechanical means shall be provided to lock out total flooding carbon dioxide systems during work in the protected space.	N\A: Total flooding carbon dioxide fire suppression systems are not used at McGuire	
3.10.9 The possibility of secondary thermal shock (cooling) damage shall be considered during the design of any gaseous fire suppression system, but particularly with carbon dioxide.	Halon 1301 does not present a potential risk of thermal shock. The Halon Systems were discharged during plant startup and did not cause a thermal shock concern.	
3.10.10 Particular attention shall be given to corrosive characteristics of agent decomposition products on safety systems.	Halon is not considered a corrosive material. Products of combustion may create potentially corrosive agents. Station procedures assure that following a fire, safety related components are examined to assure that potentially corrosive products of combustion are properly removed from safety related surfaces.	Add to Pre Fire Plans
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.		

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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.*	Auxiliary, Reactor, Diesel Generator and Turbine Buildings are separated from adjoining safety related buildings by 3 hour fire rated barriers. The McGuire Nuclear Station plant layout is arranged to isolate safety related systems from unacceptable fire hazards as demonstrated by the hazards analysis. Areas where redundant safety related systems are subject to damage from a single fire hazard are protected by a combination of fire barriers, fire detection and a suppression capability. Floors, walls and ceilings enclosing separate fire areas are constructed of materials which have minimum fire ratings of three hours. Fire barriers separating redundant analyzed Post Fire Safe Shutdown Equipment, Control Complex from the remainder of the plant, safety from non-safety related areas, or containment from non- containment areas are committed to be maintained as three hour fire rated. Penetrations through rated barriers are sealed to provide fire resistance equivalent to the barrier itself with exception of the following areas: 1. Two open spiral stairs connect the 695+0 and 716+0 foot elevations. 2. Mechanical penetration area at reactor building walls from column lines DD-52 to JJ-50 and DD-60 to JJ-62 are provided with grated metal flooring at the 733+0 foot elevation. 3. Two open spiral stairs connect the 750+0 and 767+0 foot elevations. A review of each area mentioned above, including the various components and equipment, reveals that a fire originating on one level and spreading to another level would not affect the ability to bring the unit to a hot standby condition. The design concept of the Standby Shutdown System (SSS) utilizes equipment and associated cable routings in areas unaffected by a fire in areas mentioned above. Elevations 695+0 and 716+0 could be combined and elevations 750+0 and 767+0 could be combined as one fire area. However, for simplicity of description for each level, the areas will continue to be noted as different fire area numbers. (H. B. Tucker's letter dated April 14, 1983 to J. P. O'Reilly) Ventilation penetrations through barriers are protected by standard “fire door dampers” where required except in the Reactor Building. 4. It is important that Reactor Building ventilation systems remain functional to ensure post-accident system availability. To remove any possible means of the ducts being blocked, such as by actuation of a fusible link, fire dampers were not installed in these systems where they penetrate the Reactor Building wall. (See Section D.4.(a)) 5. Three (3) hour dampers are provided only for the Battery Room and Cable Room; all remaining dampers are 1 1/2-hour fire rated. (SER-Supplement 5 provides details of this arrangement) 6. Steel members penetrate fire rated partitions. 7. Process piping penetrations through the Reactor Building shield wall incorporate a special guarded mechanical sleeve assembly. 8. Spare sleeves are sealed on both ends with 3/8 inch steel plate, 1/2 inch steel pipe caps or plugs. 9. Enclosures for personnel portals at the Reactor Building. 10. Cork expansion joint between Auxiliary, Reactor and Diesel Generator Buildings. Doors and hardware for rated openings are rated or of equivalent construction to the nationally recognized laboratory rated doors. 11. Security hardware on fire doors was not subjected to fire tests. Additional details for items 4-11 were submitted by letter to H. R. Denton from H. B. Tucker dated August 3, 1984 and approved in letter to H. B. Tucker from D. S. Hood dated May 15, 1989. Fire damper inspection methodology is described in H. D. Brandes' Memo to File dated August 19, 1983. 12. Fire barriers around duct shafts and between Cable Rooms are not three hour fire rated. (See NRR memo dated January 8, 1981 and Section D.4.f) 13. Doors to Elevator 100 are 1 1/2 hour fire rated.	Barriers are provided in accordance with Chapter 4 requirements. Ref SLC 16.9.5 DBD Section D.1a. DBD Section D.1.j

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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 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.	Fire barriers including fire barrier penetration seals are qualified in accordance with ASTM E-119. - Underwriter's Laboratory and the Southern Building Code Congress provide three hour ratings for 6" reinforced concrete floors and ceiling construction with 3/4" cover over reinforcement. The reinforced concrete floors and ceilings exceed 6" thickness with a minimum of 3/4" cover; therefore, ratings are at least three hours	Applicable barriers will be identified by Chapter 4 analysis. Current barriers are identified in SLC 16.9.5
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.*	Penetrations through rated barriers are sealed to provide fire resistance equivalent to the barrier itself with exception of the following areas: 1. Two open spiral stairs connect the 695+0 and 716+0 foot elevations. 2. Mechanical penetration area at reactor building walls from column lines DD-52 to JJ-50 and DD-60 to JJ-62 are provided with grated metal flooring at the 733+0 foot elevation. 3. Two open spiral stairs connect the 750+0 and 767+0 foot elevations. Doors and hardware for rated openings are rated or of equivalent construction to the nationally recognized laboratory rated doors. 11. Security hardware on fire doors was not subjected to fire tests. 3. Fire Boundary Doors with Security Hardware At walls which are fire and security boundaries, doors are constructed identical to those which are UL listed for three-hour fire resistance with labels attached. This security hardware was not subjected to fire tests and the door units are mortised to accept security hardware, therefore, UL labels are not attached. Considering there are no combustible materials adjacent to either side of these doors, doors are constructed identical to UL labeled doors installation of security hardware does not represent potential for fire propagation across the boundary.	DBD Section D.1.j Duke to NRC correspondence of August 3, 1984 H.B. Tucker to NRC

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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.*	See statement in section 3.11.3.	Fire barriers penetration seal qualifications are documented in calculation number MCC 1435.00-00-0006.
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 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.*	Hemyc fire barrier cable protective systems are installed on some cables in the Unit 2 Turbine Driven Feedwater Pump room. This installation is approved.	There is currently a generic issue concerning qualification of Hemyc. This is identified as URI 50-369, 370/00-09-05.

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