

Fire Protection Closure Plan

Stabilizing Fire Protection Regulatory
Infrastructure

October 2008

Accession Number

ML082840659

ENCLOSURE

ACRONYMS

1Q	First Quarter
2Q	Second Quarter
3Q	Third Quarter
4Q	Fourth Quarter
AC	Alternating Current
CY	Calendar Year
CFR	Code of Federal Regulations
DC	Direct Current
EGM	Enforcement Guidance Memorandum
EPRI	Electric Power Research Institute
ERFBS	Electrical Raceway Fire Barrier System
FAQ	Frequently Asked Question
FPSC	Fire Protection Steering Committee
FRN	Federal Register Notice
GAO	U.S. Government Accountability Office
GL	Generic Letter
IN	Information Notice
LAR	License Amendment Request
LER	Licensee Event Reports
ONS	Oconee Nuclear Station
OMA	Operator Manual Action
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPP	Nuclear Power Plant
NRC	U.S. Nuclear Regulatory Commission
NUREG	NRC Technical Report Designation (<u>N</u> uclear <u>R</u> egulatory Commission)
NUREG/CR	NUREG Contractor Report
RIS	Regulatory Issue Summary
PRA	Probabilistic Risk Assessment
SER	Safety Evaluation Report
SNP	Shearon Harris Nuclear Power Plant
SRM	Staff Requirements Memorandum

Task #1 **Stabilize the Regulatory Infrastructure Supporting Transition to Risk-Informed and Performance-Based Fire Protection Regulation – 10 CFR 50.48(c) and NFPA 805**

Objective To develop and validate regulatory processes that facilitate predictable, efficient, and effective transition of operating nuclear power plants to NRC's risk-informed and performance-based fire protection requirements.

Definition of Closure

Closure is achieved when the regulatory infrastructure is in place and the safety evaluation reports of the NFPA 805 pilot plants are issued. Review and approval of subsequent LARs is considered routine staff activity.

Background The NFPA Standards Council approved NFPA Standard 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants, 2001 Edition," (NFPA 805) on January 13, 2001, as a performance-based standard for light-water nuclear power plants. The NRC staff cooperatively participated in the development of NFPA 805. Published in February 2001, NFPA 805 describes a methodology for existing light-water nuclear power plants to apply performance-based requirements and fundamental fire protection design elements to establish fire protection systems and features for all modes of operation as well as a methodology for establishing fire protection procedures, systems, and features for decommissioning and permanently shut down nuclear power plants.

The Commission approved the final rule incorporating NFPA 805 into 10 CFR Part 50 by reference via an SRM dated May 11, 2004, entitled, "Final Rule: Revision of 10 CFR 50.48 to Allow Performance-Based Approaches Using National Fire Protection Association (NFPA) Standard 805, 'Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating.'" The rule was published on June 16, 2004, and became effective July 16, 2004. The Commission provided certain enforcement discretion as an incentive for licensees to adopt NFPA 805. Two licensees, Progress Energy and Duke Energy, volunteered Shearon Harris and Oconee respectively to become pilot plants for the transition to NFPA 805. Consequently, the staff kicked off the pilot implementation in August 2005. The staff supported the transition effort with observation visits. These observation visits document pilot plant implementation through publicly available trip reports.

In June 2006, the staff issued Regulatory Guide 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants." In July 2006, the staff endorsed the industry proposal to establish an FAQ program to provide timely clarification of issues emerging at plants transitioning to NFPA 805. The staff is holding monthly public meetings with the industry to discuss emerging issues.

As of today, operators of 48 reactor units have sent letters of intent indicating their commitment to transition to NFPA 805. In 2008, the two pilot plants submitted to the NRC their license amendment requests for review.

Steps to Closure

Due CY Quarter

Establish Regulatory Foundation

NFPA 805 issued Complete: 01/2001

10 CFR 50.48(c) promulgated Complete: 06/2004

Structure for Enforcement

New 10 CFR 50.48 enforcement policy for NFPA 805 provides a 2-year enforcement discretion period Complete: 06/2004

NFPA 805 enforcement policy revised to address licensee budgetary cycles to end of 2005 for existing non-compliances Complete: 01/2005

NFPA 805 enforcement policy revised to provide a 3-year enforcement discretion period Complete: 04/2006

Commission approves revised enforcement discretion policy for enforcement discretion to extend 6 months past issuance of the second pilot plant's SER Complete: 09/2008

Develop Implementation Guidance

Industry implementation guidance NEI 04-02, Revision 1, issued Complete: 09/2005

NRC and EPRI jointly issue NUREG/CR-6850, Fire PRA NUREG Methodology Complete: 09/2005

Regulatory Guide 1.205 issued as guidance for plants adopting NFPA 805 Complete: 05/2006

Issue revised Regulatory Guide 1.205 and Standard Review Plan for NFPA 805 2009-2Q

Complete FAQ clarification of NUREG/CR-6850 2009-2Q

Validate Implementation

Letter of intent for first pilot plant (Oconee) Complete: 02/2005

Letter of Intent for second pilot plant (Harris) Complete: 06/2005

Pilot plant LAR received for Harris Complete: 05/2008

Pilot plant LAR received for Oconee Complete: 06/2008

Final Closure

Pilot plant SERs issued 2009-3Q

Complete development of post-transition
inspection procedures and inspector training 2009-3Q

Task #2 Hemyc and MT Electrical Raceway Fire Barrier (ERFBS) Closure for Plants Transitioning to NFPA 805

Objective To complete actions to address Hemyc and MT ERFBS questions.

Definition of Closure

Closure of the safety issue has been achieved. This task remains open until the staff issues a report documenting closeout of Hemyc and MT barrier issues.

Background In response to the Browns Ferry fire, the NRC created fire protection regulations and guidelines to ensure that NPPs can be safely shut down in the event of a fire. An important new requirement of these rules was the protection of redundant trains of equipment and cables required to place the plant in a safe shutdown state. When these redundant trains of cables and equipment were in the same room or fire area, licensees often installed ERFBS to achieve the required separation.

Through the 1990's and 2000's, various concerns were raised about different designs and manufacturers of ERFBS. The NRC staff responded to these concerns by taking a variety of actions. One barrier material (Hemyc) raised more complex concerns. As a result, the NRC initiated full scale fire tests in 2004 on Hemyc. The test results indicated that Hemyc did not perform consistent with its rating for the configurations tested. The NRC issued GL 2006-03, "Potentially Nonconforming Hemyc and MT Fire Barrier Configurations," to aid in achieving final resolution of Hemyc issues.

The GL required licensees to address the Hemyc issue and describe how other fire barrier materials are capable of providing the appropriate fire resistance rating. By the end of calendar year 2007, the NRC staff reviewed all responses to the GL and concluded that the licensees have provided the requested information. Also, by the end of calendar year 2007, the NRC approved all of the licensing actions to address Hemyc issues at non-805 plants. Closure was also confirmed by inspections, which were completed at non-805 plans in September 2008.

Steps to Closure

Due CY Quarter

Establish Regulatory Foundation

10 CFR Part 50, Appendix R, Section III.G, promulgated

Complete: 11/1980

Structure for Enforcement

Non-conformances with respect to regulatory requirements are enforced using the normal enforcement process.

N/A

Develop Implementation Guidance

Staff issued IN 2005-07, "Results of HEMYC Electrical Raceway Fire Barrier System Full Scale Fire Testing" Complete: 04/2005

Staff issued GL 2006-03, "Potentially Nonconforming Hemyc and MT Fire Barrier Configurations" Complete: 04/2006

Validate Implementation

Staff responded to all GL 2006-03 information requests Complete: 12/2007

Confirm closure via inspections related to GL 2006-03 Hemyc and MT Complete: 09/2008

Final Closure

Issue final close-out documentation 2008-4Q

Task #3 Stabilize Regulatory Infrastructure to Resolve Fire-Induced Circuit Failure Issue

Objective To develop and validate a predictable, efficient, and effective process to resolve issues associated with possible fire-induced circuit failures at plants not transitioning to NFPA 805.

Definition of Closure

Closure is achieved when the regulatory infrastructure is in place and the staff completes validation of an application of the circuit resolution methodology. Review and approval of subsequent use of the circuit failure resolution methodology by individual licensees is considered routine staff activity.

Background In response to the Browns Ferry fire, the NRC created fire protection regulations and guidelines to ensure that NPPs can be safely shut down in the event of a fire. An important requirement of these rules was the protection of redundant equipment and cables required to place the plant in a safe shutdown state. This included a requirement to protect circuits from failure or mal-operation.

Beginning in 1997, a series of LERs identified plant-specific problems related to potential fire-induced electrical circuit failures that could affect equipment necessary to achieve and maintain safe shutdown. The NRC staff issued IN 99-17, "Problems Associated with Post-Fire Safe-Shutdown Circuit Analyses," on June 3, 1999, to document additional problems.

In 2001, EPRI and NEI performed a series of cable functionality fire tests to further the nuclear industry's understanding of fire-induced circuit failures, particularly spurious equipment actuations initiated by circuit failures. Based on the test results and continued interactions with industry, the NRC staff concluded that clarification of regulatory expectations was needed to assure safety and provide clear regulatory expectations in the area of fire-induced circuit failures and, where appropriate, to make plant changes to mitigate such failures.

Steps to Closure

Due CY Quarter

Establish Regulatory Foundation

Letter from S. Collins (NRC) to R. Beedle (NEI) regarding spurious actuations	Complete: 03/1997
-------------------------------------------------------------------------------	-------------------

Structure for Enforcement

Staff issues EGM 98-002, "Disposition of Violations of Appendix R, Sections III.G and II.L, Regarding Circuit Failures"	Complete: 03/1998
-------------------------------------------------------------------------------------------------------------------------	-------------------

Staff issues updated EGM for fire-induced circuit failures, including Commission direction.	2009-1Q
---------------------------------------------------------------------------------------------	---------

Develop Implementation Guidance

EPRI/NEI circuit failure testing completed at Omega Point Laboratories, Elmendorf, Texas	Complete: 06/2001
Staff and industry publish through EPRI, "Spurious Actuation of Electrical Circuits Due to Cable Fires: Results of an Expert Elicitation"	Complete: 05/2002
Staff issued RIS 2004-03, Revision 1, "Risk-Informed Approach for Post-Fire Safe-Shutdown Associated Circuit Inspections"	Complete: 12/2004
Industry published NEI 00-01, Revision 1	Complete: 01/2005
Staff issued RIS 2005-30, "Clarification of Post-Fire Safe-Shutdown Circuit Regulatory Requirements"	Complete: 12/2005
Commission issued SRM-SECY-06-0196, "Issuance of Generic Letter 2006-XX, 'Post-Fire Safe-Shutdown Circuits Analysis Spurious Actuations'"	Complete: 09/2006
Staff completes additional testing for RIS 2004-03 and issues Cable Response to Live Fire (CAROLFIRE) NUREG/CR-6931 Volumes 1, 2, and 3	Complete: 04/2008
Staff transmitted SECY 2008-0093, "Resolution of Issues Related to Fire-Induced Circuit Failures," to Commission for action	Complete: 06/2008
Industry revises NEI 00-01, Revision 2	2008-4Q
Publish RIS including draft regulatory guide clarification of circuits' expectations	2009-1Q
Issue final regulatory guide for fire induced circuit failures	2009-3Q

Validate Implementation

Licenses begin work to resolve circuits issues	2009-1Q
Establish mechanism to validate circuits issue disposition method	2009-2Q

Final Closure

Complete validation of the circuits issue
disposition method

2010-2Q

Task #4 **Stabilize Regulatory Infrastructure to Resolve Post-Fire Operator Manual Action Issues**

Objective To ensure that licensees complete appropriate actions related to the inappropriate crediting of post-fire operator manual actions.

Definition of Closure

Closure is achieved when the regulatory infrastructure is in place and the licensees submit requests for license amendments, exemptions, or complete modifications validating the effectiveness of the infrastructure. Review and approval of those applications is considered routine staff activity.

Background In response to the Browns Ferry fire, the NRC created fire protection regulations and guidelines to ensure that NPPs can be safely shut down in the event of a fire. An important requirement of these rules was the protection of redundant equipment and cables required to place the plant in a safe shutdown state. Where separation of redundant equipment could not be achieved, licensees were permitted, under certain conditions, to use post-fire OMAs to mitigate the effects of the fire.

In 2000, NRC inspections identified that some licensees compensated for the lack of approved separation by relying on operator manual actions under conditions not permitted by NRC. NRC issued RIS 2006-10 to clarify expectations.

With the intention of providing licensees an opportunity to find and correct unapproved post-fire OMAs, the NRC issued enforcement discretion for licensee-identified unapproved post-fire OMAs. This discretion provided a period of time for licensees to self-identify unapproved post-fire OMAs and also provided time for the licensees to bring those unapproved post-fire OMAs into compliance without NRC taking enforcement action. The NRC expects the unapproved post-fire OMAs to be resolved through reanalysis, procedure changes, modifications, or by requesting approval from the NRC. Facilities transitioning to NFPA 805 will address OMAs as part of the transition.

The NRC also issued NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," to assist NRC staff in reviewing post-fire OMA applications under conditions permitted by the NRC. NUREG-1852 is publicly available so that licensees are able to examine the factors that the NRC staff will review.

Licensees are expected to complete their modifications or submit information for NRC acceptance by March 6, 2009, the date that the enforcement discretion expires.

Steps to Closure

Due CY Quarter

Establish Regulatory Foundation

Commission issues SRM-SECY-04-0233, "Proposed Rulemaking - Post-Fire Operator Manual Actions," dated January 18, 2005 Complete: 01/2005

Staff issues Fire Protection Program - Post-Fire Operator Manual Actions Federal Register Notice 71 FR 11169, March 1, 2005 – Withdrawal of the proposed rule Complete: 03/2005

Structure for Enforcement

Staff issues enforcement discretion for OMAs as part of EGM 2007-004 for OMAs – Enforcement discretion ends March 2009 Complete: 06/2007

Develop Implementation Guidance

Staff publishes NRC RIS 2006-10, "Regulatory Expectations with Appendix R, Paragraph III.G.2, Operator Manual Actions" Complete: 06/2006

Staff published NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire" Complete: 10/2007

Validate Implementation

Licensees complete corrective actions and/or request amendments/exemptions 2009-1Q

Staff validates the effectiveness of the infrastructure completing review of one licensee's resolution of the issue 2010-2Q

Final Closure

Infrastructure stabilized and validated 2010-2Q

Task #5 Assess Regulatory Effectiveness

Objective Assess the effectiveness of the ongoing stabilization of the fire protection regulatory framework.

Definition of Closure

Closure is achieved when a monitoring process is in place and the baseline is established. Ongoing implementation of the process is considered routine staff activity.

Background On July 29, 2008, the Commission directed the staff in SRM M080717, "Briefing on Fire Protection Issues," to provide the Commission a plan to assess the effectiveness of the ongoing improvements to the fire protection regulatory framework using recent plant data to establish a baseline. Such a baseline could be, for example, the number and general type of all open fire protection deficiencies that were compensated and the manner of compensation used in CY2007.

The GAO Report 08-747, "Nuclear Safety: NRC's Oversight of Fire Protection at U.S. Commercial Nuclear Reactor Units Could Be Strengthened," June 2008, included a recommendation to, "Develop a central database for tracking the status of exemptions, compensatory measures, and manual actions in place nationwide and at individual commercial nuclear units."

The Chairman responded regarding the GAO report in a letter to Congress dated, September 11, 2008, committing to, "Implement a Fire Protection Closure Plan to resolve the issues contributing to the long term use of compensatory measures. The Commission has directed the staff to include meaningful metrics to gauge progress in implementation of the Closure Plan." The issues of long-term compensatory measures and unapproved manual actions that have associated compensatory measures will be resolved by this action.

Steps to Closure

Due CY Quarter

Commission Commitments

Determine metric for measuring effectiveness of ongoing improvements	2008-4Q
Develop metric monitoring methodology	2009-1Q

Final Closure

Collect information and establish monitoring	2009-3Q
----------------------------------------------	---------

Task #6 Historical Lessons Learned From Fire Protection

Objective Enhance confidence that the regulatory infrastructure challenges that existed in the fire protection area do not occur in other regulatory areas.

Definition of Closure

Closure is achieved when a lessons learned review is completed, lessons are incorporated into a knowledge management/training program and the adequacy of that knowledge management/training program is validated using a pilot application. Ongoing staff awareness/training is considered routine staff activity.

Background On July 29, 2008, the Commission directed the staff in SRM M080717, "Briefing on Fire Protection Issues," to provide a Closure Plan to the Commission that includes training to appropriate staff on the important historical lessons learned from the fire protection issue resolution activities since 10 CFR Part 50, Appendix R, was established.

Steps to Closure

Due CY Quarter

Perform Lessons Learned Evaluation

Compile History 2009-1Q

Develop Lessons Learned 2009-3Q

Develop Knowledge Management/Training Tool

Develop Training on Lessons Learned 2010-1Q

Pilot Training on Fire Protection Lessons Learned 2010-1Q

Final Closure

Incorporate lessons learned from pilot training 2010-2Q

Task #7 **Exemption Database**

Objective To develop a centralized database of fire protection exemptions for operating nuclear reactors.

Definition of Closure

Closure is achieved when the exemption database is established and procedures/plans are in place for periodic updating of that database. Periodic updates to the database are considered routine staff activity.

Background The GAO Report 08-747, "Nuclear Safety: NRC's Oversight of Fire Protection at U.S. Commercial Nuclear Reactor Units Could Be Strengthened," June 2008, included a recommendation to, "develop a central database for tracking the status of exemptions."

The Chairman responded regarding the GAO report in a letter to Congress dated, September 11, 2008, committing to, "develop a centralized database of fire protection exemptions for operating nuclear reactors."

Steps to Closure

Due CY Quarter

Commission Commitments

Collect data on Fire Protection Exemptions 2009-2Q

Complete development of database 2009-4Q

Final Closure

Establish procedure for updates 2010-1Q

Task #8 **Establish Reasonable Assurance That All Past Regulatory Infrastructure Instabilities Are Identified**

Objective Identify any additional fire protection regulatory infrastructure issues that require further action.

Definition of Closure

Closure is achieved when the review is complete and appropriate actions are taken to any fire protection regulatory issues identified. Addressing any additional issues identified is considered routine staff activities.

Background Since publication of the fire protection rule in 1981, the NRC has identified and dispositioned a large number of issues using regulatory practices that were deemed appropriate at the time these issues were identified.

The NRC staff has initiated a review to identify any outstanding fire protection regulatory issues by surveying cognizant individuals concerning the regulatory history of fire protection. The effort to identify additional issues will give the staff a more complete understanding of the issues and documentation of how the NRC addressed all identified issues.

Steps to Closure

Due CY Quarter

Commission Commitments

Complete Review	2009-1Q
Evaluate Responses	2009-2Q

Final Closure

Identify Issues and Develop Recommendations	2009-2Q
---------------------------------------------	---------