From: John Runkle [mailto:jrunkle@pricecreek.com]
Sent: Wednesday, November 10, 2010 4:25 PM
To: Hackett, Edwin; Said Abdel-Khalik
Cc: Lai, John; jim warren; dave lochbaum; Paul Gunter
Subject: Deficiencies in NFPA 805

November 10, 2010

To: Edwin Hackett, Executive Director, ACRS

Dr. Said Abdel-Khalik, Chairman, ACRS

cc. John Lai, Staff Engineer

In reviewing the agenda for the November 16 meeting of the ACRS Reliability and PRA Subcommittee Meeting, it appears that the members of the Subcommittee may not be receiving a full picture of the deficiencies in NFPA
805 process. On behalf of the NC Waste Awareness and Reduction Network, Beyond Nuclear and the Union of Concerned Scientists, I am requesting that you do not attempt to resolve the issue without due consideration of the continuing problems with fire protection.

Fully enforced fire protection regulations are vital to public safety at the nation's nuclear power plants.

The NRC estimates that fire represents 50% of the overall risk of meltdown at US plants. Appendix R contains more objective criteria for fire protection than NFPA 805, yet licensees continue to violate those prescriptive requirements, with little oversight by the NRC.

I am attaching a report by David Lochbaum of the Union of Concerned Scientists analyzing the 805 process along with a June 14, 2010 memo from Alex Klein of the Office of Nuclear Reactor Regulation listing 16 areas of fire protection work that are incomplete or poorly understood, many of which are not expected to be resolved for more than a year, if ever. These are fundamental problems that have plagued NRC and industry efforts to resolve decades of fire noncompliance, such as understanding the impact of smoke damage to electrical control circuits; understanding the effectiveness of fire suppression agents; and using computer models that failed tests intended to help predict how fire impacts cables controlling the nuclear reactor.

The NFPA 805 models have yet to be validated and verified, and yet the NRC plans to allow dozens of other plant owners to adopt NFPA 805, including the licensees for new reactors. It seems clear that licenses to build new reactors - already seriously delayed by design and cost problems - could be further hampered if fire protection remains such an intransigent problem.

Currently, the Office of Inspector General (OIG) is investigating issues related to the continuing lack of enforcement of fire protection rules and the deficiencies in the NFPA 805 process. We believe the OIG will again substantiate our concerns about inadequate NRC oversight of fire protection, as both the OIG and the US Government Accountability Office did in 2008.

Please forward this email and attachments to the members of the ACRS Subcommittee.

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Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

NFPA 805 IMPLEMENTATION CONCERNS

UCS POSITIONS:

1. The NFPA 805 option in 10 CFR 50.48 is neither better than nor worse than the traditional Appendix R approach to managing the fire hazard risk.

2. The NFPA 805 option affords equivalent protection to the traditional Appendix R approach.

   In other words, UCS is not re-litigating the rulemaking process that led to the NFPA option.

3. Licensees have the option of complying with either the NFPA 805 option or the traditional Appendix R approach.

4. Non-compliance with the NFPA 805 option has the same consequence as non-compliance with the traditional Appendix R approach – people aren't getting the protection guaranteed them under the regulation.

5. Licensees must not be given the option of not complying with both the NFPA 805 option and the Appendix R approach.

BACKGROUND:

A worker using a candle in March 1975 to check for air leaks in the cable spreading room beneath the control room at Browns Ferry ignited flammable material used to seal a penetration where cables passed through the wall. The ensuing fire disabled all of the emergency core cooling systems on Unit 1 and most of those systems on Unit 2. Heroic and ad hoc operator actions prevented a reactor core meltdown.

The NRC revised its regulations to lessen the fire hazard risk. Those revisions, called the traditional Appendix R approach here, specified measures like physical separation of cabling for primary and backup safety systems, one-hour and three-hour fire wraps (time separation), fire detection and suppression methods, and other deterministic measures.

Nearly thirty years later, NRC's inspections revealed numerous non-compliances with the traditional Appendix R approach. Perhaps the most common non-compliance was reliance on unapproved operator manual actions in lieu of physical separation or fire suppression or some other regulatory requirement.

In our view, the promulgation of the NFPA 805 option in 2004 had one significant implicit concession by the NRC and the nuclear industry – reactors were not even close to being in compliance with the traditional Appendix R approach.

Case in point, Harris – the pilot reactor for the NFPA 805 option. That licensee was recently quoted in the press as having spent $30 million on its NFPA 805 project. Unless this licensee is incompetent, this admission means it would have cost more than $30 million to achieve compliance with the traditional Appendix R approach.

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UCS assumes that licensees did not intentionally fail to comply with the traditional Appendix R approach. Rather, they achieved compliance with what they thought the regulations required only to have the NRC judge those efforts shy of those standards.

If so, it is imperative that the licensees and the NRC have a common understanding of what constitutes compliance with the NFPA 805 option. Otherwise, the path that led to so many licensees being so far out of compliance with the traditional Appendix R approach will be re-trod.

FOREGROUND:

The NRC concedes (see Information Sheet titled *Methods for Applying Risk Analysis to Fire Scenarios*) that the NFPA 805 option is more complicated than the traditional Appendix R approach. This carries the inherent aspect of being more vulnerable to misunderstanding by licensees.

A review of publicly available materials demonstrates that the NRC has not yet established the proper foundation for any reactor to adopt the NFPA 805 options. Too much homework remains to be done for the NRC to approve any one's NFPA 805 plans. For example:

- The NRC and EPRI are in the process of updating the fire events database that is used to determine the initiating event frequencies – a vital factor in risk calculations. See Information Sheet titled *Fire PRA Methods Development and Stakeholder Interaction*

- The NRC, EPRI and NIST evaluated fire computer models used to analyze fires. That effort culminated in NUREG-1824. That effort concluded that none of the models matched experimental fire results for parameters like radiant heat flux, room temperature, and target temperature. Worse yet, none of the models demonstrated a consistent bias by over-predicting or under-predicting. Sometimes the computer models over-predicted experimental results and sometimes they under-predicting experimental results. See Information Sheet titled *Fire Modeling Activities* and table prepared by UCS from UREG-1824 Table 3-1

- By memo dated June 14, 2010, NRC staffer Alex Klein outlined work completed to date and work still outstanding for the NPFA 805 option. Much work remains uncompleted, such as:
    - Updating the Fire Modeling User's Guide (target date – March 2011)
    - Updating the fire events database (NUREG/CR-6850) (target date – December 2010)
    - Understanding the electrical cabinet heat release rate (target date – June 2011)
    - Understanding smoke damage to control circuits (target date – June 2011)
    - Understanding effectiveness of gaseous fire suppression agents (target date – September 2011)
    - Understanding flame spread rates for electrical cables (target date – June 2011)
    - Defining expectations for fire brigade training (target date – September 2011)
    - Defining expectations for using water to suppress electrical fires (target date – September 2011)

  Former NRC manager Rich Barrett once commented that "risk is defined by what you don't know, not what you know." If so, there are too many unknowns at this time for the NRC to approve a risk-informed approach to managing the fire hazard risk. Initiating event frequencies are being revised. The effectiveness of mitigating measures and when measures can and cannot be credited are still being developed.

- By memo dated May 24, 2010, the NRC noticed an upcoming meeting in Region II regarding non-compliance issues at Browns Ferry and other sites. More than 35 years after the Browns Ferry fire, Browns Ferry is not in compliance with the regulations adopted by the NRC in 1980 to manage the fire hazard risk.

- By proceeding down the NFPA 805 option highway without first crisply and cleanly establishing expectations, the NRC and its licensees are no more likely to have reactors comply with the NFPA 805 option in 2045 than they are to have reactors comply with the traditional Appendix R approach. That's pitiful, just pitiful.

- There's no excuse today for replicating the regulatory debacle that is the traditional Appendix R approach.

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Information Sheet: Methods for Applying Risk Analysis to Fire Scenarios (MARIAFIRES)-2008

David Stroup, Felix Gonzalez, and Roy Woods *(NRC/RES/DRA)*

Background

In 1995, the NRC adopted a policy statement on PRA with the intent to increase the use of PRA technology in all regulatory matters to the extent supported by the state of the art in PRA methods and data. In 2001, the NRC's Office of Nuclear Regulatory Research (RES) embarked on a cooperative project with the Electric Power Research Institute (EPRI) to improve the state-of-the-art in fire risk assessment to support this new risk-informed environment as applied to fire protection. This project produced a consensus document, NUREG/CR-6850 (EPRI 1011989), entitled "Fire PRA Methodology for Nuclear Power Facilities" which addresses fire risk for at-power operations. In 2004, the NRC amended its fire protection requirements to allow existing reactor licensees to voluntarily adopt the risk-informed, performance-based, 10CFR50.48(c) rule, that endorses National Fire Protection Association (NFPA) 805 "Performance Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants", as an alternative to the existing prescriptive fire protection requirements.

Approach

In practice, NUREG/CR-6850 (EPRI 1011989) provides an effective, albeit complex, methodology for application of risk-informed methods to fire protection. Because of the complexity, initially a forum was generated to discuss technical issues with its application, from which it was learned that licensees and inspectors could benefit from the firsthand experience of their predecessors who had employed the tactics outlined in NUREG/CR-6850 (EPRI 1011989) for a number of years. Without such training and examples of how the methodology should be implemented, it was realized the it would be a challenge for users to adopt the new way of thinking about fire risk assessment.

Therefore, beginning in 2005, bi-annual conferences and workshops were held to train risk analysts in the use of this methodology. Initially, these meetings served as forums to allow analysts to discuss tactics and personal experiences dealing with this fire probabilistic risk analysis methodology, but they have since developed into training courses for users and reviewers of the methodology.

The most recent workshops were held in 2008 from 29 September through 2 October, and again from 17-20 November, in Bethesda, MD, They attracted about 170 participants including domestic representatives from NRC Headquarters and all four Regional Offices, Department of Energy (DOE), National Aeronautics and Space Administration (NASA), EPRI, NPP Utilities' Licensees, Nuclear Steam Supply System (NSSS) Vendors, Consulting Engineering firms, and Universities. Also in attendance were international representatives from Belgium, Canada, France, Japan, South Korea, Spain, and Sweden.

Those training workshops were video-recorded, and adapted by NRC-RES Fire Research Branch (FRB) members with support from EPRI for use as an alternative training method for those who were unable to physically attend the training sessions. This material will be published in the near future as NUREG/CP-0194 (EPRI 1020621), which can also serve as a refresher for those who attended one or more training sessions, and would be useful preparatory material for those planning to attend a session.

Figure 1: Course attendees shown in a typical session of the 2008 workshops.

For More Information
Contact David Stroup, RES/DRA at 301-251-7609, David.Stroup@nrc.gov; or
Felix Gonzalez, RES/DRA at 301-251-7596, Felix.Gonzalez@nrc.gov; or
Roy Woods, RES/DRA at 301-251-7577, Hugh.Woods@nrc.gov

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Information Sheet: **Fire PRA Methods Development and Stakeholder Interaction,**

JS Hyslop and Jessica Kratchman *(NRC/RES/DRA)*

Background

The results of the Individual Plant Examinations of External Events (IPEEE) program and actual fire events indicate that fire can be a significant contributor to nuclear power plant risk, depending on design and operational conditions. In particular, failures of fire protection defense-in-depth, (i.e. failure to prevent fires, failure to rapidly suppress fires, or failure to protect plant systems to provide stable, safe shutdown) can lead to risk significant conditions. Fire PRA (probabilistic risk assessment) provides a structured, integrated approach to evaluate the impact of failures in the fire protection defense-in-depth strategy on safety. Those technical issues directly addressed in fire PRA are fire ignition frequency, detection and suppression, fire damage to diverse and redundant trains of core cooling equipment, circuits (i.e. spurious actuations), and plant response including manual operator actions.

In 1995, the NRC adopted a policy statement on PRA with the intent to increase the use of PRA technology in all regulatory matters to the extent supported by the state of the art in PRA methods and data. Through the use of PRA, safety is enhanced by gaining insights which supplement NRC's traditional approach of maintaining defense in depth and safety margin, as well as our overall engineering judgment. In 2004, NRC amended its fire protection requirements to allow existing reactor licensees to voluntarily adopt the risk-informed, performance-based rule, 10CFR50.48c, which endorses NFPA 805 "Performance Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants", as an alternative to the existing prescriptive fire protection requirements. In order to realize the full benefits of transitioning to the Risk Informed/Performance Based standard, plants will need to perform a fire PRA.

Approach

In 2001, the Electric Power Research Institute (EPRI) and U.S. NRC Office of Nuclear Regulatory Research (RES) embarked on a cooperative project to improve the state-of-the-art in fire risk assessment to support this new risk-informed environment in fire protection. This project produced a consensus document, NUREG/CR-6850 (EPRI 1011989), entitled "Fire PRA Methodology for Nuclear Power Facilities" which addresses fire risk for at-power operations.

NRC and EPRI jointly conducted well-attended general fire PRA workshops based upon NUREG/CR-6850 in both 2005-06, and detailed training in 2007-09. Additional detailed training will be offered in 2010. Pilot plants transitioning to the rule, 10CFR50.48c, are relying upon NUREG/CR-6850 for upgrading their fire PRA, while the NRC uses it to support reviews. RES and EPRI have worked to produce interim solutions to nearly all the fire PRA issues raised related to NUREG/CR-6850 implementation in the NFPA 805 frequently-asked-questions (FAQ) program.

Additionally, NRC-RES and EPRI are working jointly to update and improve the fire events database used for NUREG/CR-6850 (EPRI 1011989). Initially, fire ignition frequencies will be updated; however, other applications are envisioned. Overall, this joint work is producing a significant convergence of technical approaches.

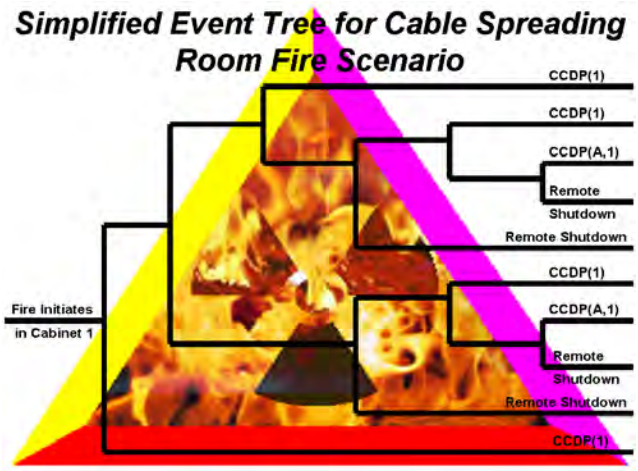

Figure 1: Simplified fire event tree representing different sets of fire damage and plant response. The conditional core damage probability (CCDP) represents failure of only the cabinet in which the fire initiates, the additional fire-induced failure of train A, and fire-induced failure of both trains A and B leading to remote shutdown operations.

For More Information

Contact J.S Hyslop, RES/DRA at 301-251-7611; js.hyslop@nrc.gov; or
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National Institute for Standards and Technology (NIST)

Information Sheet: **Fire Modeling Activities,** David Stroup *(NRC/RES/DRA)*

Background

The results of the Individual Plant Examinations of External Events program and actual fire events indicate that fire can be a significant contributor to nuclear power plant (NPP) risk, depending on design and operational conditions. Fire models are often used to evaluate fire scenarios in risk assessments. The models are used to determine damage to cables and other systems and components important to safety. They also are used to characterize the progression of fire beyond initial targets. Used in these ways, fire models are important tools in determining the contribution of fire to the overall risk in NPPs.

In 2004, NRC amended its fire protection requirements to allow existing reactor licensees to voluntarily adopt the fire protection requirements contained in NFPA 805. NFPA 805 allows licensees to use fire models to evaluate their fire protection program. However, the fire models used must be verified and validated and acceptable to NRC. To this end, NRC's Office of Nuclear Regulatory Research, along with the Electric Power Research Institute (EPRI) and the National Institute of Standards and Technology (NIST), conducted an extensive verification and validation (V&V) study of fire models used to analyze NPP fire scenarios. This study resulted in the seven-volume report, "Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications," NUREG-1824.

A need exists in fire risk assessments to determine when cables fail during a fire in NPPs. In the past, cable-damage models have been crude and have not been validated. Recently, as part of the Cable Response to Live Fire (CAROLFIRE) program, NRC and NIST have developed a simple cable damage model called Thermally-Induced Electrical Failure (THIEF). This model uses empirical information about cable failure temperatures and calculations of the thermal response of a cable to predict the time to cable damage. The THIEF model was benchmarked and validated against real cable failure and thermal data acquired during the CAROLFIRE program.

Approach

The results in NUREG-1824 are designed to be used by licensees and NRC to provide insights into the predictive capabilities of the various models evaluated. For example, although engineering calculations have limited capabilities, they provide reasonable estimates of certain phenomena when used within limitations. These insights are valuable to fire model users who are developing analyses to support transition to NFPA 805, to justify exemptions from existing prescriptive regulatory requirements, and to conduct reviews under the Reactor Oversight Process.

The THIEF model has been implemented in both two-zone and computational fluids dynamics models at NIST. In addition, NRC has implemented the THIEF model into its fire dynamics tools spreadsheets (NUREG-1805). The THIEF spreadsheet is a useful tool for inspectors and licensees to quickly determine the likelihood of cable damage given a fire or to indicate the need for further analysis.

NRC has completed a Phenomena Identification and Ranking Table study of fire modeling (NUREG/CR-6978). This effort identified important fire-modeling capabilities that need to be developed to improve our confidence in the results. This study is being used to help define future research priorities in fire modeling.

NRC currently is working with EPRI and NIST again to develop technical guidance to assist users of fire models who conduct fire-modeling analyses of NPPs. This guidance will continue to expand on the effort of NUREG-1824 by providing users with best practices from experts in fire modeling and NPP fire safety.

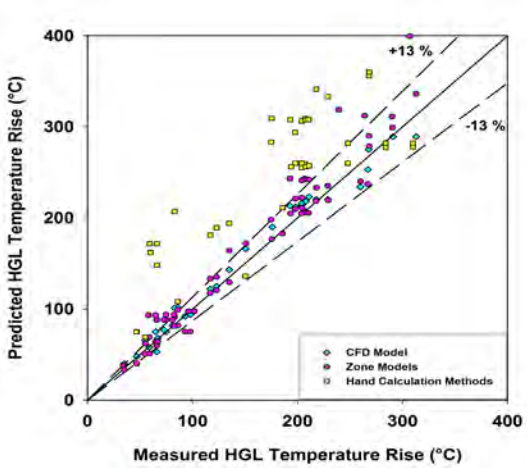

Figure 1. Measured vs. Predicted Hot Gas Layer Temperature Rise. The models evaluated provide reasonable estimates of actual temperature rise.

For More Information
Contact David Stroup at 301-251-7609 or david.stroup@nrc.gov.

Parameter		Fire Model				
		FDT	FIVE R1	CFAST	MAGIC	FDS
Hot gas layer temperature (upper layer temperature)	Room of Origin	YELLOW +	YELLOW +	GREEN	GREEN	GREEN
	Adjacent Room	n/a	n/a	YELLOW	YELLOW +	GREEN
Hot gas layer height (layer interface height)		n/a	n/a	GREEN	GREEN	GREEN
Ceiling jet temperature (target/gas temperature)		n/a	YELLOW +	YELLOW +	GREEN	GREEN
Plume temperature		YELLOW -	YELLOW +	n/a	GREEN	YELLOW
Flame height		GREEN	GREEN	GREEN	GREEN	YELLOW
Oxygen concentration		n/a	n/a	GREEN	YELLOW	GREEN
Smoke concentration		n/a	n/a	YELLOW	YELLOW	YELLOW
Room pressure		n/a	n/a	GREEN	GREEN	GREEN
Target temperature		n/a	n/a	YELLOW	YELLOW	YELLOW
Radiant heat flux		YELLOW	YELLOW	YELLOW	YELLOW	YELLOW
Total heat flux		n/a	n/a	YELLOW	YELLOW	YELLOW
Wall temperature		n/a	n/a	YELLOW	YELLOW	YELLOW
Total heat flux to walls		n/a	n/a	YELLOW	YELLOW	YELLOW

GREEN	The model is appropriate for the parameter being examined and calculated results agree with experimental results. "A grade of GREEN indicates the model can be used with confidence to calculate the specific attribute."
YELLOW	The model is appropriate for the parameter being examined but the calculated results under-predict and over-predict results obtained by experimentation with no consistent pattern.
YELLOW -	The model is appropriate for the parameter being examined but the calculated results consistently under-predict results obtained by experimentation.
YELLOW +	The model is appropriate for the parameter being examined but the calculated results consistently over-predict results obtained by experimentation.
n/a	The validation and verification effort did not investigate this capability.

Source: Nuclear Regulatory Commission NUREG-1824 Vol. 1, May 2007, Table 3-1

June 14, 2010

Memorandum To: Mark A. Cunningham, Director
Division of Risk Assessment
Office of Nuclear Reactor Regulation

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

SUBJECT: COMPLETION OF REVIEW OF PAST REGULATORY INSTABILITIES RELATED TO NUCLEAR POWER PLANT FIRE PROTECTION — ANNUAL UPDATE

The purpose of this memorandum is to provide office management with the annual update on the Fire Protection Survey. The staff closed out Task 8 of Commission Paper SECY-08-0171, "Plan for Stabilizing Fire Protection Regulatory Infrastructure in a July 1, 2009, memorandum, "Completion of Review of Past Regulatory Instabilities Related to Nuclear Power Plant Fire Protection," (Agencywide Documents Access and Management System (ADAMS), Accession Number ML091690226).

The survey identified nineteen issues with associated completion dates and responsible organizations. Enclosure 1 is a detailed status summary for the nineteen issues. Enclosure 2 provides a table summarizing the issues. Three issues have been completed, twelve are currently on path to completion and four have not yet been started. This paper provides the first annual update of issues identified by the Fire Protection Survey.

The three issues that have been completed are Issue 1 concerning electrical raceway fire barriers, Issue 12 concerning the development of an exemption database, and Issue 19 concerning the definition of "Associated Circuit".

The NRC staff plans to issue the next status summary update in June 2011.

Enclosures:
As stated

CONTACT: Stephanie Weimer, NRR/DRA
(301) 415-3381

Below is a summary of the progress of the remaining issues. Enclosure 1 contains the summary in table format.

Issue 1: Electrical Raceway Fire Barrier Systems (ERFBS)

Completed May 2010
Reference Document: NUREG 1924

Issue 2: Fire Modeling User's Guide

Internal stakeholders have identified the need for a fire modeling user's guide to help internal and external stakeholders appropriately apply fire models.

Office of Nuclear Regulatory Research (RES) developed a fire modeling user's guide draft to complement NUREG-1824, "Fire Model Verification and Validation." The user's guide provides a detailed understanding of the uses and limitations of the five fire models verified and validated in NUREG-1824. The draft was issued and the period for public comments ended April 30, 2010. RES is currently incorporating the public comments. Six documents containing the public's comments are publicly available in ADAMS.

Previous Completion Date: March 2010
Updated Completion Date: March 2011

Issue 3: Fire Probabilistic Risk Assessment (PRA) Update

Internal stakeholders have identified the need for a fire PRA update based on the lessons learned from the implementation of National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants."

RES plans to issue NUREG/CR-6850, Supplement 1 by December 2010.

Previous Completion Date: August 2010
Updated Completion Date: December 2010

Issue 4: Better Understanding of Electrical Cabinet Heat Release Rate

Internal stakeholders have expressed an interest to better understand the heat release rate of fires in electrical cabinets to improve the state of knowledge for fire PRA.

RES is developing a plan for this task.

Completion Date: June 2011

Issue 5: Better Understanding of Smoke Damage to Control Circuits

Internal stakeholders have expressed an interest to better understand smoke damage to control circuits.

RES will do a literature review consolidating documentation and test reports regarding smoke damage to control circuits. After the literature review, RES will develop a testing plan to fill in gaps.

Completion Date: June 2011

Issue 6: Gaseous Fire Suppressant Agents

Internal stakeholders have expressed an interest in improving the state of knowledge on gaseous fire suppressant agents, specifically regarding their effectiveness on deep-seated fires and gas migration.

RES is preparing a NUREG-series report that will consolidate documentation regarding all known carbon dioxide and other fire suppression system gas migration occurrences and information regarding the amount of gaseous agent and hold time to extinguish deep-seated fires.

Completion Date: September 2011

Issue 7: Compensatory Measures

Internal stakeholders have expressed an interest in consolidating documentation regarding the use of compensatory measures.

RES will consolidate this information and will provide information regarding available alternative technologies for implementing fire protection compensatory measures. RES will document this information in a NUREG-series report.

Previous Completion Date: September 2010
Updated Completion Date: November 2010

Issue 8: Tracking Flame Spread Rate for Electrical Cables

Internal stakeholders identified the need for a better understanding of flame spread rates for fires in electrical cables to improve the state of knowledge for fire PRA.

RES is currently performing testing and will issue the results in a NUREG-series report.

Completion Date: June 2011

Issue 9: Update Inspection Manual Chapter 0609, Appendix F, Fire Protection Significance Determination Process

Internal stakeholders identified four issues with Inspection Manual Chapter (IMC) 0609, Appendix F, the “Fire Protection Significance Determination Process.” IMC 0609, Appendix F, does not provide sufficient guidance to inspectors for evaluating:

- findings in multiple fire areas,
- risk significance for identified fire brigade issues,
- findings involving control room evacuation, and
- findings related to fire brigade performance deficiencies.

Division of Risk Assessment (DRA) staff has been assigned to evaluate these issues and is currently developing milestones to track their progress.

Previous Completion Date: December 2009
Updated Completion date: December 2011

Issue 10: Fire Induced Circuit Failures

Internal stakeholders have expressed the need to develop a process for resolving fire induced circuit failure issues.

This issue is being tracked as Task 3 in SECY 08-0171, "Plan for Stabilizing Fire Protection Regulatory Infrastructure." Steps 4 of 5 of Task 3 have been completed.

Previous Completion Date: June 2010
Updated Completion Date: December 2010

Issue 11: Operator Manual Actions

Internal stakeholders have expressed a need to have a process to identify and evaluate operator manual actions.

This issue is being tracked as Task 4 in SECY 08-0701, "Plan for Stabilizing Fire Protection Regulatory Infrastructure." Steps 3 of 5 of Task 4 have been completed.

Previous Completion Date: June 2010
Updated Completion Date: December 2010

Issue 12: Exemption Database

Completed April 2010
Reference Document: ML100200007

Issue 13: Fire Brigade Drill Participation

Internal stakeholders have expressed a need for guidance to evaluate participation requirements during fire brigade drills to address the lack of detail in current participation requirements.

NRR plans to provide guidance in its next revision of Regulatory Guide 1.189, "Fire Protection for Nuclear Power Stations," regarding this issue.

Completion Date: September 2011

Issue 14: Application of Water Based Fire Suppressants to Electrical Fires

Internal stakeholders have identified a need to outline appropriate conditions for the use of water based fire suppressants on electrical fires to address recent incidents where water was not used and the fire continued to burn.

NRR plans to update Regulatory Guide 1.189, to add guidelines for fire brigades to apply water based fire suppressants to electrical fires.

Completion Date: September 2011

Issue 15: Identifying and Managing Risk When Removing Safe Shutdown Equipment from Service for Maintenance

Internal stakeholders have expressed a need to identify and manage risk when safe shutdown equipment is removed from service for maintenance purposes.

DRA staff has been assigned to evaluate these issues and is currently developing milestones to track their progress.

Previous Completion Date: December 2009
Updated Completion Date: December 2011

Issue 16: NFPA 805, Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants

Internal stakeholders have expressed a need to develop and validate regulatory processes for NFPA 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants," transitioning plants.

NRR is in its final stage of preparing the SER for Shearon Harris Nuclear Power Plant. NRR is reviewing Oconee Nuclear Station's revised LAR.

Previous Completion Date: March 2010
Updated Dates:
Harris Completion Date: June 2010
Oconee Completion Date: December 2010

Issue 17: NFPA 805 Triennial Inspection Procedures

Internal stakeholders have expressed a need for training on inspection procedures that address new requirements for plants transitioning to NFPA 805, "Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants."

NRR is developing training modules and materials for inspection personnel related to the fire protection program in support of Inspection Manual Chapter 1245, "Qualification Program for the Office of Nuclear Reactor Regulation." RES will prepare training materials using NUREG/CR-6850 and NUREG-1824 for regional and resident inspectors who perform fire protection inspections under the Reactor Oversight Process.

Previous Completion Date: December 2010
Updated Completion Date: December 2011

Issue 18: Define "Adverse to Safe Shutdown"

Internal stakeholders have expressed an interest in having this term defined.

NRR plans to provide guidance in its next revision of Regulatory Guide 1.189, "Fire Protection for Nuclear Power Stations."

Completion Date: September 2011

Issue 19: Define "Associated Circuit"

Completed October 2009
Reference Document: RG 1.189 Revision

Status Summary Table

ISSUE		LEAD ORGANIZATION	STATUS	ESTIMATED COMPLETION DATE
1	Electrical Raceway Fire Barrier Systems (ERFBS)	RES/DRA/FRB	Complete	May-10
2	Fire Modeling User's Guide	RES/DRA/FRB	Incorporating Public Comments	Mar-11
3	Fire Probabilistic Risk Assessment (PRA) Update	RES/DRA/FRB	NUREG/CR-6850, Supplement 1 Update in Process	Dec-10
4	Better Understanding of Electrical Cabinet Heat Release Rate	RES/DRA/FRB	In Progress	Jun-11
5	Better Understanding of Smoke Damage to Control Circuits	RES/DRA/FRB	In Progress	Jun-11
6	Gaseous Fire Suppressant Agents	RES/DRA/FRB	Not Started	Sep-11
7	Compensatory Measures	RES/DRA/FRB	Collecting Information	Nov-10
8	Tracking Flame Spread Rate for Electrical Cables	RES/DRA/FRB	Draft NUREG/Continuing Research	Jun-11
9	Update IMC 0609, Appendix F – Fire SDP	NRR/DRA/APOB	Developing Milestones	Dec-11
10	Fire Induced Circuit Failures	NRR/DRA/AFPB	Working on Validation of the Circuit Issue Disposition Method	Dec-10
11	Operator Manual Actions	NRR/DRA/AFPB	Issuing SERs	Dec-10
12	Exemption Database	NRR/DRA/AFPB	Complete	Apr-10
13	Fire Brigade Drill Participation	NRR/DRA/AFPB	Not Started	Sep-11
14	Application of Water Based Fire Suppressants to electrical fires	NRR/DRA/AFPB	Not Started	Sep-11
15	Identifying and Managing Risk When Removing Safe Shutdown Equipment from Service for Maintenance	NRR/DRA/AFPB	Developing Milestones	Dec-11

16	NFPA 805, Performance-Based Standard for Fire Protection for Light-Water Reactor Electric Generating Plants	NRR/DRA/AFPB	Harris- Preparing SER Oconee-Reviewing Revised LAR	Dec-10
17	NFPA 805 Triennial Inspection Procedures	NRR/DRA/AFPB	Developing Inspection Guidance	Dec-11
18	Define "Adverse to Safe Shutdown"	NRR/DRA/AFPB	Not Started	Sept-11
19	Define "Associated Circuit"	NRR/DRA/AFPB	Complete	Oct-09

Memorandum To: Mark A. Cunningham, Director
Division of Risk Assessment
Office of Nuclear Reactor Regulation

FROM: Alexander R. Klein, Chief
Fire Protection Branch
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: COMPLETION OF REVIEW OF PAST REGULATORY INSTABILITIES RELATED TO NUCLEAR POWER PLANT FIRE PROTECTION — ANNUAL UPDATE

The purpose of this memorandum is to provide office management with the annual update on the Fire Protection Survey. The staff closed out Task 8 of Commission Paper SECY-08-0171, "Plan for Stabilizing Fire Protection Regulatory Infrastructure in a July 1, 2009, memorandum, "Completion of Review of Past Regulatory Instabilities Related to Nuclear Power Plant Fire Protection," (Agencywide Documents Access and Management System (ADAMS), Accession Number ML091690226).

The survey identified nineteen issues with associated completion dates and responsible organizations. Enclosure 1 is a detailed status summary for the nineteen issues. Enclosure 2 provides a table summarizing the issues. Three issues have been completed, twelve are currently on path to completion and four have not yet been started. This paper provides the first annual update of issues identified by the Fire Protection Survey.

The three issues that have been completed are Issue 1 concerning electrical raceway fire barriers, Issue 12 concerning the development of an exemption database, and Issue 19 concerning the definition of "Associated Circuit".

The NRC staff plans to issue the next status summary update in June 2011.

Enclosures:
As stated

CONTACT: Stephanie Weimer, NRR/DRA
(301) 415-3381

ADAMS Accession No. ML101530627

OFFICE	NRR/DRA/AFPB	NRR/DRA/AFPB	BC: NRR/DRA/AFPB
NAME	SWeimer	DFrumkin	AKlein DM Frumkin for
DATE	06/ 7/10	06/ 14 /10	06/ 14 /10

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May 24, 2010

MEMORANDM TO: Timothy J. Kobetz, Chief
Reactor Inspection Branch
Division of Inspection & Regional Support
Office of Nuclear Reactor Regulation

FROM: Jeremy S. Bowen, Reactor Operations Engineer ***/RA/***
Reactor Inspection Branch
Division of Inspection & Regional Support
Office of Nuclear Reactor Regulation

SUBJECT: NOTICE OF FORTHCOMING MEETING TO DISCUSS FIRE PROTECTION SCREENING CRITERIA IDENTIFIED AT BROWNS FERRY AND THE IMPLICATIONS FOR OTHER NUCLEAR POWER PLANTS

DATE & TIME: Tuesday, June 8, 2010
8:00 AM – 4:00 PM

LOCATION: Atlanta Marriott Marquis Hotel
265 Peachtree Center Avenue
Room TBD
Atlanta, GA 30303
www.atlantamarquis.com

PURPOSE: To update licensees on recent NRC efforts to evaluate certain plants against screening criteria developed using Browns Ferry and other greater-than-Green findings related to fire protection; and to provide licensees an opportunity to update the NRC on how these criteria may have been addressed at their sites.

CATEGORY 2:* This is a Category 2 meeting. The public is invited to participate in this meeting by discussing regulatory issues with the Nuclear Regulatory Commission (NRC) at designated points identified on the agenda.

CONTACTS:

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* Commissions' Policy Statement on "Enhancing Public Participation in NRC Meetings," 67 *Federal register* 36920, May 28, 2002.

PARTICIPANTS: Participants include members from the NRC's Office of Nuclear Reactor Regulation, Region II, and Region IV.

NRC	Industry
NRR	Entergy
Region II	Progress Energy
Region IV	Southern Nuclear Operating Company
	Florida Power & Light
	South Carolina Electric & Gas

The NRC provides reasonable accommodation to individuals with disabilities where appropriate. If you need a reasonable accommodation to participate in a meeting or need a meeting notice, the transcript, or other information from a meeting in another format (e.g., Braille, large print) please notify the NRC's meeting contact. Determinations on requests for reasonable accommodation will be made on a case-by-case basis.

Interested members of the public can participate in this meeting via a toll-free audio teleconference. Please inform the meeting contact listed above before June 2, 2010 if you wish to participate in this manner.

Enclosure:
1. Meeting Agenda
2. Region II Lodging Information

PARTICIPANTS: Participants include members from the NRC's Office of Nuclear Reactor Regulation, Region II, Region IV.

NRC	Industry
NRR	Entergy
Region II	Progress Energy
Region IV	Southern Nuclear Operating Company
	Florida Power & Light
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Interested members of the public can participate in this meeting via a toll-free audio teleconference. Please inform the meeting contact listed above before June 2, 2010 if you wish to participate in this manner.

Enclosure:
Meeting Agenda

DISTRIBUTION (via e-mail):
PUBLIC

F. Brown, NRR	J. Lubinski, RII	R. Caniano, RIV
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R. Martin, NRR	Q. Nguyen, NRR	
J. Paige, NRR		

ADAMS ACCESSION NUMBER: ML101400505 - Meeting Notice
ML101440094 – Region II Lodging Information

OFFICE	NRR/DIRS/IRIB	RII/DRS/EB2*via phone	RIV/DRS/EB2**via e-mail	NRR/DIRS/IRIB
NAME	JBowen JB	RNease (NStaples* for)	N. O'Keefe**	T. Kobetz TK
DATE	05/20/2010	05/20/2010	05/20/2010	05/24/2010

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AGENDA FOR THE JUNE 8, 2010 PUBLIC MEETING

CONCERNING FIRE PROTECTION SCREENING CRITERIA IDENTIFIED AT

BROWNS FERRY AND THEIR IMPLICATIONS FOR OTHER NUCLEAR POWER PLANTS

June 8, 2010
8:00 AM – 4:00 PM

Atlanta Marriott Marquis Hotel
265 Peachtree Center Avenue
Room TBD
Atlanta, GA 30303

TIME*	TOPIC*	LEAD
8:00 AM – 8:15 AM	Opening Remarks & Introduction	NRC
8:15 AM – 8:30 AM	Background on Browns Ferry Finding	NRC
8:30 AM – 3:30 PM	Discussion of screening criteria and preliminary evaluations for: (order to be determined) • Arkansas Nuclear One • Brunswick • Farley • Turkey Point • V. C. Summer See attachment for additional information.	NRC
3:30 PM – 3:45 PM	Opportunity for Public Comment	
3:45 PM – 4:00 PM	Summary and Closing Remarks	NRC

*Tentative schedule. Breaks will be taken as necessary.

Attachment:
1. Summary of Fire Protection Screening Criteria

ENCLOSURE

Summary of Fire Protection Screening Criteria
Identified at Browns Ferry and the Implications for Other Nuclear Power Plants

In a letter dated April 19, 2010, the NRC issued a final significance determination for a fire protection inspection at Browns Ferry Nuclear Plant (ML101090503). One of the findings identified during this inspection dealt with multiple cable separation issues that was determined to have substantial safety significance. Subsequently, an NRC working group was created to identify the factors that led to the safety significance of the Browns Ferry finding, and to identify other plants that may have characteristics similar to those at Browns Ferry.

The focus of the working group was on protection and separation of safe shutdown equipment for scenarios that do not involve control room evacuation; therefore, the evaluation started with a screening question to determine whether a unit has potential issues with protection or separation. Subsequent to this entry condition, the working group conducted a review of the circumstances surrounding the historical greater-than-Green fire protection findings (including the findings at Browns Ferry) in order to identify the major contributing factors to the greater-than-Green findings. Eight screening criteria were identified as the more significant contributors to fire risk. The group then identified plants with known cable separation issues and further evaluated each of these plants against the eight additional screening criteria.

The working group utilized existing and readily-available information in their initial evaluation. Limited data gathering was only performed in a few cases. The evaluations were based on the results of the most recent triennial inspection along with inspector(s) knowledge of the site. The screening criteria are:

1. A relatively large number of operator manual actions (OMAs) used to mitigate cable separation issues.
2. A single fire that could affect more than one unit. A multi-unit site with significant cross-unit distribution of safety-related and safe shutdown electrical loads while at power may necessitate multi-unit shutdowns for a fire in a single area, making operator response more complex.
3. The use of thermoplastic cable insulation. In postulated fires, damage to such cables occurs at lower temperature and longer distances from the fire source, compared to the more commonly used thermoset cables.
4. Limited documentation of cable routing within the plant. Licensees possessing limited information regarding the routing of all cables could result in higher reliance on safe shutdown strategies with elevated risk.
5. A Self-Induced Station Black-Out (SISBO) strategy (isolating on-site power to basically everything except the protected train to prevent spurious actuations) for fires in areas without adequate cable separation. This strategy may unnecessarily remove equipment that may not be damaged by the fire and therefore might otherwise be available for safe shutdown. The working group considered this strategy sufficiently important that they decided to double-weight this criterion. The SISBO strategy was only considered where

the entire plant was de-energized downstream of the startup transformers. Plants that had breaker realignments due to coordination problems or limited equipment isolation were not considered us using the SISBO strategy.

6. Use of complex OMAs. Complex OMAs are those which require several steps to restore a function or require coordination between more than one operator in different locations. Whether or not operators would have sufficient time to complete the OMAs was also a consideration when determining if the OMAs could be implemented in a fire scenario.
7. Mitigation of a fire requires cross-tying electrical or mechanical systems from multiple units in order to achieve safe shutdown for a fire in a single area.
8. Symptom-based fire response procedures with complex OMAs. Requiring operators to identify and diagnose multiple equipment damage scenarios in order to select the appropriate responses increases the complexity and operator stress involved, potentially reducing the reliability of the OMAs. Also, because of the potential for fragmented responses through the use of these procedures, initial actions may be disrupted by later operator actions.

Licensees were notified which screening criteria were preliminarily identified for their plant via separate correspondence. During the public meeting the NRC staff will be available to discuss these screening criteria in more detail and will provide each licensee with an opportunity to present any information on the applicability of these criteria to their plant. For example, these criteria may have been identified and appropriately mitigated through a plant's transition to NFPA 805. The meeting is not intended to be a detailed technical discussion. The specifics regarding each licensee will be discussed for a limited amount of time