



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

November 6, 2003

MEMORANDUM TO: ACRS Members

FROM: Marvin D. Sykes, Senior Staff Engineer **/RA/**
Technical Support Staff
ACRS/ACNW

SUBJECT: CERTIFICATION OF THE MINUTES OF THE MEETING OF THE
ACRS SUBCOMMITTEE ON FIRE PROTECTION, SEPTEMBER 9,
2003 - ROCKVILLE, MARYLAND

The minutes of the subject meeting, issued on October 22, 2003, have been certified as the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

cc: J. Larkins
S. Bahadur
S. Duraiswamy
ACRS Staff Engineers

October 22, 2003

MEMORANDUM TO: Stephen L. Rosen, Chairman
Fire Protection Subcommittee

FROM: Marvin D. Sykes, Senior Staff Engineer **/RA/**
ACRS/ACNW

SUBJECT: WORKING COPY OF THE MINUTES OF THE ACRS
SUBCOMMITTEE ON FIRE PROTECTION, SEPTEMBER 9, 2003 -
ROCKVILLE, MARYLAND

A working copy of the minutes for the subject meeting is attached for your review. Please review and comment on them at your soonest convenience. If you are satisfied with these minutes please sign, date, and return the attached certification letter in the pre-addressed envelope attached.

Attachment: Minutes (DRAFT)

cc w/o Attachment:

J. Larkins
S. Bahadur
S. Duraiswamy
ACRS File

CERTIFIED

11/06/03

By Stephen L. Rosen

Issued: 10/22/03

CERTIFIED

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS MINUTES OF ACRS SUBCOMMITTEE MEETING ON FIRE PROTECTION SEPTEMBER 9, 2003 ROCKVILLE, MARYLAND

On September 9, 2003, the ACRS Subcommittee on Fire Protection held a meeting in Room T2B3, 11545 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss the proposed rulemaking to revise 10 CFR 50.48, endorsing National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," as a voluntary alternative to the existing fire protection requirements, the staff's approach for resolving post-fire safe shutdown circuit analysis issues, and the proposed rulemaking plan for post-fire operator manual actions. The staff also demonstrated newly developed fire dynamics tools for inspectors.

There were no requests to make oral statements received from members of the public. A written comment was submitted by Mr. John C. Biechman, Vice President Government Affairs, National Fire Protection Association (NFPA). A copy of the written comments, the presentation slides, and handouts are attached to the Office Copy of the Meeting Minutes.

The meeting was open to the public. Mr. Marvin Sykes was the Designated Federal Official for this meeting. The meeting was convened at 8:30 a.m. and adjourned at 5:25 p.m. on September 9, 2003.

ATTENDEES:

ACRS MEMBERS/STAFF

S. Rosen, Chairman
T. Kress, Member
G. Wallis, Member

J. Sieber, Member
D. Powers, Member
M. Sykes, ACRS Staff

NRC STAFF/PRESENTERS

S. Black, NRR
J. Hannon, NRR
S. Weerakkody, NRR
P. Lain, NRR
P. Qualls, NRR
N. Iqbal, NRR
E. Lois, RES
Catherine Haney, NRR
P. Koltay, NRR

M. Johnson, NRR
Eileen McKenna, NRR
M. Salley, NRR
D. Diec, NRR
J. Birmingham, NRR
J. S. Hyslop, RES
E. Brown, NRR
S. Richards, NRR
D. Frumkin, NRR

NUCLEAR INDUSTRY REPRESENTATIVES

F. Emerson, NEI
Dennis Henneke, Duke Power

H. Doug Brandes, Duke Power

Opening Remarks (Chairman/Designee)

Mr. Stephen Rosen, Chairman of the Subcommittee on Fire Protection, provided introductory remarks and introduced John Hannon, Branch Chief for the Plant System Branch (SPLB) of the Office of Nuclear Reactor Regulation (NRR) to begin the staff presentation.

Staff Introduction

Mr. Hannon provided brief introductory remarks for the staff and introduced Mr. Sunil Weerakkody. Mr. Weerakkody provided the key elements of the presentations and the identified the other staff presenters. Mr. Weerakkody's provided an overview of the discussions that were scheduled and emphasized that the staff was continuing to work closely with the industry to identify creative and effective means to achieve fire safety without undue regulatory burden. He also expressed his opinion that the development of a more risk-informed and performance-based regulatory approach was necessary in achieving that goal.

NRC STAFF PRESENTATION ON PROPOSED REVISION TO 10 CFR 50.48

Paul Lain and Joseph Birmingham of NRR and J.S. Hyslop of RES were introduced to discuss the rulemaking effort to revise 10 CFR 50.48. The key points of their presentation were:

Background

Mr. Lain began the presentation by explaining the need for rulemaking. He noted that the existing fire protection regulations contain prescriptive requirements that do not allow for the use of risk insights to alter basic plant fire protection requirements. This in turn has resulted in numerous exemption requests from licensees. Mr. Lain discussed the staff's involvement with the industry in developing National Fire Protection Association (NFPA) Standard 805 which was issued in February 2001 as a performance-based national consensus standard that takes advantage of the advances in probabilistic risk assessment (PRA) and fire science that have been developed since Appendix R was issued. The proposed revision to 10 CFR 50.48 will endorse the use of NFPA 805, with few exceptions, as an acceptable method for complying with existing fire protection requirements.

Advantages

Mr. Lain continued his presentation by identifying potential advantages of adopting NFPA 805. The major benefits of the proposed rule from an industry perspective include an allowance for the use of risk methods for resolving current fire protection issues, and creating a licensing basis for fire protection that addresses the four NRC pillars of maintaining safety, increasing public confidence, reducing regulatory burden, and increasing agency efficiency and effectiveness. The rule will allow licensees and staff to focus fire protection programs on those areas that are more risk-significant. Mr. Lain also noted the possible reduction in licensee-regulator interactions to resolve non-risk significant issues while maintaining safety through more flexible, efficient, and rational processes and the resulting reduction in the total number of exemptions and license amendment requests submitted to the NRC.

NFPA 805 Structure

Mr. Lain confirmed that licensees implementing an NFPA 805 program would continue to adhere to the core elements of current fire protection programs with allowances to use either deterministic or performance-based approaches in managing their fire protection programs. To take advantage of these allowances when modifying their fire protection programs, licensees must perform risk evaluations of the proposed changes and verify that no unacceptable increases in risk result from the change. NFPA 805 uses criteria set forth in Regulatory Guide 1.174, "An Approach for using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis," for determining acceptable changes in core

damage frequency (CDF) or large early release frequency (LERF). If CDF or LERF risk criteria associated with a given change are satisfied, then fundamental fire protection requirements would be satisfied and NRC approval of that change would not be required.

Rule structure

Mr. Birmingham explained that the rule was structured as an amendment to 10 CFR 50.48 which incorporates NFPA 805, 2001 Edition as an alternative to Appendix R with six specific exceptions. The adoption of the NFPA 805 standard is voluntary and would require a license amendment. The existing licensing basis configuration and procedures would transfer to the new risk-informed performance-based environment. Licensees would be required to document changes to the fire protection program and retain those records on site for inspection under the NRC's Reactor Oversight Process. Newer alternatives to NFPA 805 would still have to be approved by the staff before implementation by a licensee.

Implementation

Mr. Birmingham referred to the work that the Nuclear Energy Institute, (NEI) had undertaken to develop an implementing guide for licensees adopting NFPA 805, which the staff will review and, if found acceptable, endorse in a regulatory guide. Mr. Birmingham emphasized that NFPA 805 is applicable to the current fleet of light water reactors only. Advanced designs are addressed in NFPA 804.

Current Status

Mr. Birmingham informed the Committee that the draft final rule has been provided to the Office of General Counsel for final review and concurrence. The staff has submitted comments to NEI on Revision D of NEI-00-01, Guidance for Implementing a Risk-Informed Performance-Based Fire Protection Program Under 10 CFR 50.48(c) which is expected to be finalized following issuance of the revised rule.

Schedule

Mr. Birmingham summarized the schedule for issuance of the final rule. He informed the Committee that the Office concurrences on the final rule are planned for October 2003 with the final rule to ACRS, CRGR, in December 2003. Barring any unforeseen problems, the final rule is expected to be forwarded to the Commission Spring 2004 and published one month after issuance of a Commission Staff Requirements Memorandum (SRM).

Member Comments

Dr. Powers reminded the staff to be mindful of the potential impacts that the rule change may have on inspection resources once several plants transition to NFPA 805.

NEI PRESENTATION ON 10 CFR 50.48 RULEMAKING

Fred Emerson, NEI, and H. Doug Brandes, Duke Power were introduced to discuss the proposed rule from an industry perspective. Mr. Brandes began the presentation. The key points of his discussion were:

Development of the Implementing Guide

Mr. Emerson and Mr. Brandes discussed the industry efforts to develop and pilot test NEI-04-01, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)" which may be used by licensees choosing to implement a risk-informed performance-based fire protection program. The NRC may choose to endorse the NEI implementing guide in a Regulatory Guide. The implementing guidance may also be used

as a vehicle for addressing issues as they arise during the rulemaking process. Other methods for addressing emergent issues during the rulemaking process may include direct changes to the rule language and/or placing the information in the statement of consideration for the rule. The key elements addressed by the guide include the transition process, licensee options, maintaining the existing licensing basis with the possible use of NFPA 805 tools, adopting a new licensing basis, and maintaining licensing basis configuration control once the transition has been made.

Mr. Brandes discussed the pilot evaluations conducted at the McGuire and Farley Stations indicating that the draft implementing guide was comprehensive and included adequate information to establish an effective risk-informed performance-based fire protection program consistent with the language included in the draft rule.

Mr. Brandes implied, based on discussions with other licensee representatives, that there are a few plants that are probably considering adopting NFPA 805 once the rulemaking becomes final. He noted that the plants that are most likely to use it are ones that are upgrading their safe shutdown fire protection programs. It was also suggested that a large number of utilities would move in the same direction once they saw the benefits of NFPA 805 are realized and they could have successful regulatory interactions using risk tools in the fire area.

Other major points from Mr. Emerson's presentation include:

- The industry views this as an evolutionary process and emphasized that the staff must make significant effort to ensure that the process used to transition to the NFPA 805 is uncomplicated.
- Licensee and the NRC staff must have a thorough understanding of the licensing basis through the transition.
- The industry is fully aware that the use of the NFPA 805 tools would not relieve a licensee of the requirement to obtain NRC approval before making changes to its licensing basis; but, the focus of the staff review would be on the results of the analysis and the applicability of the results to the plant.

NRC STAFF PRESENTATION ON RESOLUTION OF ASSOCIATED CIRCUIT ISSUES

Sunil Weerakkody and Mark Sally of the Fire Protection Engineering and Special Projects Section of NRR and J.S. Hyslop of RES presented a discussion on staff efforts to risk-inform the inspection and resolution of post-fire safe shutdown circuit analysis issues. The key points of the presentation were:

Background

Mr. Salley provided an overview of the selected issues identified by inspectors related to post-fire safe shutdown circuit analysis. Several examples are included in NRC Information Notice 99-17, "Problems Associated with Post-Fire Safe-Shutdown Circuit Analysis," dated June 3, 1999. In response to this issue, NEI undertook a voluntary industry initiative to conduct special cable fire tests at Omega Point Laboratories to test the configuration and vulnerability of certain configurations of cable susceptibility to spurious actuations (and multiple spurious actuations). NEI developed criteria based upon those test results for post-fire safe-shutdown circuit analysis. NEI formed an expert panel, tasked with the interpretation of the cable fire test results and drafted NEI -00-01, "Guidance for Post-Fire Safe Shutdown."

Mr. Salley explained that the NRC temporarily halted certain associated circuit inspections, pending completion of the industry initiative during Spring 2002 because of the inability to readily assess the impact of cable routing errors, separation errors, fire induced hot shorts, and post-fire spurious equipment operation on a plant's ability to reach safe shutdown.

Since that time the staff has worked with the industry and international organizations to develop circuit analysis definitions, principles, illustrations, and practical methods for implementation of the resolution techniques used to determine the potential consequences of postulated associated circuit failures. The staff also initiated a series of activities which included a February 19, 2003 meeting with all interested stakeholders to reach a consensus on definitions of significant and non-significant hot shorts. The staff also informed stakeholders of their efforts to revise the inspection guidance and their intent to retract the memo halting associated circuit inspections. The staff has issued a Regulatory Issue Summary (RIS) informing the stakeholders of their findings in terms of very significant hot shorts and how they would be used in a new inspection guidance.

New inspection procedures are being developed and the staff expects to resume circuit analysis inspection Fall 2003. The guidance will focus staff and licensee resources on very significant issues rather than looking at all hot shorts in any circuit. The staff believes that this approach will enable them to get the most effective use of inspection resources and also would minimize the impact on the licensing staff researching licensing basis issues. The staff believes that their approach to resolving this issue is appropriate and that licensees will continue to be motivated to find and fix significant circuit issues and focus resources on issues that add value in maintaining public health and safety. The staff was also looking at all kinds of options to find a way within their processes to eliminate unnecessary engagement with licensees.

Member Comments

Dr. Wallis noted that the EPRI/NEI test were not complete since it did not include some repeated tests to assess the experimental repeatability of the results.

Dr. Powers questioned why the Office of Research had not been tasked to develop a standardized tool to support associated circuit analysis issues rather than relying on the industry test results.

NEI PRESENTATION ON ASSOCIATED CIRCUIT ISSUES

Fred Emerson of NEI was then introduced to discuss NEI's resolution of the circuit failure issues identified by the staff. Some of the highlights of Mr. Emerson's presentation include:

- NEI is conducting several activities to resolve circuit failure issues. The results of these activities will be reflected in the final version of NEI 00-01. These activities include the circuit failure testing and expert panel review.
- The EPRI report detailing the results and evaluation of the EPRI-sponsored tests is nearly complete. The Office of Nuclear Regulatory Research and Sandia National Laboratory participated in the tests, and Sandia has issued reports on the work that they did in conjunction with NEI/EPRI during the test program. One of the principal inputs to the expert panel deliberations was the test results.

- The test program considered and tested valve motor starter actuations, multi-conductor and single-conductor cables in fire, shorts to ground, hot shorts, vertical and horizontal tray configurations, different types of cable (at least three significantly different types of cable were tested), and the effects of water spray post-fire. The test program was designed to look at the various parameters that were significant. The test program was designed to test for spurious actuations and shorts to ground, and to determine when they would occur, if they would occur, and under what circumstances they would occur.
- Mr. Emerson provided some test observations (not data analysis results). Circuit failures were observed during the test that resulted in device actuations. Open circuits (NRC regulations require plants to consider these when performing a safe shutdown analysis) during the testing were not observed. Mr. Emerson noted that the test results confirmed that the likelihood of failure is dependent on the cable type and orientation and fire exposure time and temperature. In general, with some exceptions, the time to failure for cables was observed to be greater than 30 minutes. The time to failure appeared to be longer for thermoset types of cable or armored cables. In response to a question from the Subcommittee, it was clarified that Mr. Emerson was presenting observations, not data analysis. EPRI's expert panel findings are documented in a report that is available from EPRI.
- Mr. Emerson closed by saying that NEI believes that the NEI 00-01 methodology is workable with a reasonable level of effort for each plant, and gives results which are believable.

NRC PRESENTATION ON DEVELOPMENT OF FIRE DYNAMICS TOOLS

Naeem Iqbal and Mark Salley of NRR demonstrated a newly developed tool for fire hazard analysis that may be used by inspectors to evaluate the potential significance of postulated fire scenarios. The tool consists of several spreadsheets that allow the staff to complete prompt evaluations of the potential risks of postulated fires.

In general, the subcommittee members applauded the staff efforts and thought that the fire dynamics spreadsheets could be valuable, if used by inspectors, to envision fire progression scenarios, including fire detection and propagation effects. The question as to whether the inspectors actually use the tool is yet to be answered.

NRC PRESENTATION ON POST-FIRE OPERATOR MANUAL ACTION RULEMAKING

David Diec and Phil Qualls of NRR and Erasmia Lois of RES were introduced to discuss proposed rulemaking to address the widespread reliance in licensee safe shutdown analyses on operator manual actions in lieu of physical barriers and or detection and suppression systems. He explained that operator manual actions are not permitted under 10 CFR 50, Appendix R, Paragraph III.G.2 for plants licensed to operate before 1979, unless an exemption has been granted. For plants licensed after 1979, there is uncertainty as to whether operator manual actions can be used without NRC approval, since Appendix R is not required for those plants. Although limited use of operator manual actions have been approved by the NRC in previous plant-specific exemptions and deviations, generic use of manual actions has not been recognized as an alternative to separation of safe shutdown trains. The inspection staff has also identified several unapproved operator manual actions that were credited in licensee procedures for achieving safe shutdown during or after a credible fire that had not or could not be validated.

Mr. Diec explained that the objectives of the rulemaking are to permit the use of operator manual actions as an alternative to paragraph III.G.2 of Appendix R to Part 50, establish generic acceptance criteria for acceptable operator manual actions and eliminate the need for prior NRC approval of manual actions that comply with the established acceptance criteria. The proposed rulemaking plan has been submitted to the Commission for review. The Commission Staff Requirements Memorandum is expected September 2003.

One Subcommittee member commented that the staff and industry should consider developing quantitative techniques for evaluating manual actions that incorporate human error forcing functions and establishes threshold values for evaluating the risk effectiveness and acceptability of manual actions.

Member Comments

In general, the subcommittee members supported the staff's current course of action to initiate rulemaking to address licensee's reliance on operator manual actions.

NEI PRESENTATION ON PROPOSED MANUAL ACTION RULEMAKING

Fred Emerson of NEI provided an industry perspective on the use of operator manual actions. He noted that licensee's have interpreted the regulatory guidance as allowing this practice and have used operator manual actions as a redundant means of safe shutdown since the 1980's without concern from the NRC.

Mr. Emerson stated that the industry disagrees with the staff's proposed interim approach for inspections which implies that a Green SDP finding will be issued even when manual actions are deemed feasible. Mr. Emerson noted that the NRC should continue to work with the industry to bridge the gap between the current regulation and the proposed rule to limit difficulties for licensees and inspectors and prevent unnecessary inspection findings.

Mr. Emerson also discussed the August 18, 2003 letter from the Nuclear Energy Institute to the Commission requesting a direct final rule on this issue to speed the process. If the request for a direct final rule is not approved, the industry believes that inspections should be suspended until the new rule is finalized or enforcement discretion should be applied.

Mr. Emerson concluded by informing the subcommittee that the industry believes that the staff criteria for feasibility of operator manual actions are generally appropriate and that manual actions can safely support plant shutdown if their risk effectiveness is demonstrated. He also repeated that steps should be taken to eliminate inspector and licensee uncertainty about the use of manual actions.

SUBCOMMITTEE DECISIONS

The Subcommittee Chairman will report to the ACRS committee during the full Committee meeting.

PRESENTATION SLIDES AND HANDOUTS PROVIDED DURING THE MEETING

The presentation slides and handouts used during the meeting are available in the ACRS files or as attachments to the transcript.

BACKGROUND MATERIAL PROVIDED TO THE SUBCOMMITTEE

1. NRC Information Notice 99-17, Problems Associated with Post-Fire Safe Shutdown Circuit Analyses, dated June 3, 1999.
2. Nuclear Energy Institute (NEI) 00-01, Revision 0, Guidance for Post-Fire Safe Shutdown, dated May 2003.
3. Nuclear Energy Institute (NEI) 04-01, Revision D, Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c), dated May 2003.
4. NUREG 1805, Fire Dynamics Tools (FDTs), Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program, dated June 2003.

NOTE: Additional details of this meeting can be obtained from a transcript of this meeting available in the NRC Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, MD, (301) 415-7000, downloading or view on the Internet at <http://www.nrc.gov/reading-rm/doc-collections/acrs/> can be purchased from Neal R. Gross and Co., 1323 Rhode Island Avenue, NW, Washington, D.C. 20005, (202) 234-4433 (voice), (202) 387-7330 (fax), nrgross@nealgross.com (e-mail).
