



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

November 8, 2002

MEMORANDUM TO: ACRS Members

FROM: Tim Kobetz, Senior Staff Engineer
ACRS

A handwritten signature in black ink, appearing to read "Tim Kobetz", written over the printed name.

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS SUBCOMMITTEE MEETING ON FIRE PROTECTION REGARDING NEI 00-01, "GUIDANCE FOR POST-FIRE SAFE SHUTDOWN ANALYSIS," AND THE PROPOSED REVISION TO 10 CFR 50.48 ENDORSING NFPA 805," FIRE PROTECTION FOR LIGHT WATER REACTOR ELECTRIC GENERATING PLANTS" JUNE 4, 2002 - ROCKVILLE, MARYLAND

The minutes of the subject meeting, issued on November 5, 2002, 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 via e-mail:

J. Larkins
S. Bahadur
ACRS Fellows and Technical Staff

cc: ACRS Secretary
E. Barnard



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

MEMORANDUM TO: Tim Kobetz, Senior Staff Engineer
ACRS

FROM: Mr. Stephen L. Rosen, Chairman
Fire Protection Subcommittee

SUBJECT: WORKING COPY OF THE MINUTES OF THE ACRS SUBCOMMITTEE
MEETING ON FIRE PROTECTION REGARDING NEI 00-01,
"GUIDANCE FOR POST-FIRE SAFE SHUTDOWN ANALYSIS," AND
THE PROPOSED REVISION TO 10 CFR 50.48 ENDORSING NFPA
805, "FIRE PROTECTION FOR LIGHT WATER REACTOR ELECTRIC
GENERATING PLANTS" JUNE 4, 2002 - ROCKVILLE, MARYLAND

I hereby certify that, to the best of my knowledge and belief, the minutes of the subject meeting issued on November 5, 2002, are an accurate record of the proceedings for the meeting.


Mr. Stephen L. Rosen, Chairman
Fire Protection Subcommittee

Date

11/7/02



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

November 5, 2002

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

FROM: Tim Kobetz, Senior Staff Engineer
ACRS

A handwritten signature in black ink, appearing to read "Tim Kobetz", written over the printed name.

SUBJECT: WORKING COPY OF THE MINUTES OF THE ACRS SUBCOMMITTEE
MEETING ON FIRE PROTECTION REGARDING NEI 00-01,
"GUIDANCE FOR POST-FIRE SAFE SHUTDOWN ANALYSIS," AND
THE PROPOSED REVISION TO 10 CFR 50.48 ENDORSING NFPA
805," FIRE PROTECTION FOR LIGHT WATER REACTOR ELECTRIC
GENERATING PLANTS" JUNE 4, 2002 - ROCKVILLE, MARYLAND

A working copy of the minutes for the subject meeting is attached for your review. I would appreciate your review and comment as soon as possible. Copies are being sent to the Fire Protection Subcommittee members who attended the meeting for information and/or comment.

Attachment: As stated

cc: T. Kress
J. Sieber

cc via e-mail:
J. Larkins
S. Bahadur
S. Duraiswamy

Issued: 11/05/02
Certified: 11/07/02

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF ACRS SUBCOMMITTEE MEETING ON
FIRE PROTECTION
JUNE 4, 2002
ROCKVILLE, MARYLAND

On June 4, 2002, the Subcommittee on Fire Protection heard presentations by and held discussions with representatives from the NRC staff and the Nuclear Energy Institute (NEI) regarding the proposed revision to 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 risk-informed performance-based standard for determining fire protection requirements in commercial nuclear power plants. The Subcommittee members, the staff, and NEI representatives discussed the proposed rule, the NFPA 805 Standard, the plan for implementation of the rule, the development of implementation guidance by NEI, and the resolution of concerns identified by NEI. In addition, the Subcommittee reviewed the Draft Revision C of the NEI Guidance Document NEI 00-01, "Guidance for Post-Fire Safe Shutdown Analysis," and the associated staff comments. Mr. Sam Duraiswamy and Mr. Robert B. Elliott were the cognizant ACRS staff engineers for this meeting. The meeting was convened at 8:30 a.m. on June 4, 2002, and adjourned at 12:28 p.m. on the same day.

ATTENDEES:

ACRS

S. Rosen, Chairman
T. Kress, Member
R. Elliott, ACRS Staff

J. Sieber., Member
S. Duraiswamy, ACRS Staff

NRC STAFF

S. Black, NRR
E. Weiss, NRR
E. Connell, NRR

J. Hannon, NRR
M. Salley, NRR

NUCLEAR ENERGY INSTITUTE (NEI)

F. Emerson

There were no written comments or requests for time to make oral statements received from members of the public. Approximately eight members of the public attended the meeting. A list of meeting attendees is available in the ACRS office files.

INTRODUCTION

Member Rosen, Chairman of the Subcommittee on Fire Protection, provided introductory remarks for this session, and introduced the staff to begin their presentation. The staff made its presentation on the proposed rule. Mr. John Hannon, Branch Chief for the Plant System Branch

(SPLB) of the Office of Nuclear Reactor Regulation (NRR), provided introductory remarks for the staff.

NRC STAFF PRESENTATION ON PROPOSED REVISION TO 10 CFR 50.48

Mr. Eric Weiss, from SPLB, gave the staff's presentation. The key points of Mr. Weiss's presentation were:

- **Background:** The existing fire protection regulations contain prescriptive requirements. The ACRS was critical of NFPA 805 during its development because it did not allow risk assessments to be used to alter basic fire protection requirements. The staff considered the Committee's comments in the development of the proposed rule. Regulatory Guide (RG) 1.189, "Fire Protection for Operating Nuclear Power Plants," was recently issued to lay out criteria for an adequate fire protection program. NFPA 805 was developed as a risk-informed national consensus standard, and was issued in February of 2001. The proposed revision to 10 CFR 50.48 endorsing NFPA 805 is consistent with the National Technology Transfer and Advancement Act and OMB Circular A119 which require federal agencies to use national consensus standards in lieu of agency developed or specific criteria when they serve the needs of the agency. NFPA 805 takes advantage of the advances in probabilistic risk assessment (PRA) and fire science that have been developed since Appendix R was issued 20 years ago. Advances in fire modeling and PRA since the issuance of Appendix R have been substantial and the proposed rule permits fire protection to be risk-informed and performance-based, without requiring exemptions from licensees.
- **Advantages of the proposed rule:** The NFPA 805 standard allows licensees to maintain safety through more flexible, efficient and rational processes. A net result of this is that the staff believes the rulemaking will reduce the number of exemptions and license amendment requests.
- **NFPA 805 structure:** NFPA 805 allows the transition from the existing Appendix R licensing basis, including the exemptions and the Generic Letter (GL) 86-10, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area," equivalencies, to risk informed techniques. Future changes to the plant may be either deterministic or risk-informed. However, if changes are made (either deterministic or risk-informed), the licensee must still evaluate the risk associated with the change. Acceptable changes in core damage frequency (CDF) or large early release frequency (LERF) are consistent with the guidelines of Regulatory Guide 1.174, "An Approach for using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis." If the licensee meets the risk CDF or LERF criteria associated with a given change, then NRC approval of that change is not required. The standard also includes a change control process. New performance-based risk-informed techniques may be utilized for meeting the requirements of the standard once they have been approved by the NRC. Chapter 3 of NFPA 805 still retains a list of fundamental fire protection requirements that are prescriptive. The staff could allow new risk-informed performance-based methods to replace these requirements in the future.

- Rule structure: The rule is structured as an amendment to 10 CFR 50.48. The adoption of the NFPA 805 standard is voluntary. Licensees may elect to keep their existing Appendix R licensing basis. The existing licensing basis configuration and procedures would convey to the new risk-informed performed-based environment. Licensees would document their licensing basis changes and retain the records on site for inspection. The reactor oversight process would monitor future changes. The NRC would review and approve any new risk-informed performed-based methods used by licensees or a licensee may opt to use the methodologies described in the appendices to NFPA 805.
- Summary/schedule: NEI will develop a guidance document for implementation of the rule which the staff will review, and if found acceptable, endorse in a regulatory guide. NFPA 805 addresses the existing fleet of light water reactors only. The proposed rule was provided to the Commission in July 2002. The proposed rule will be published in the Federal Register for public comment for a period of one month. The final rule is scheduled to go to the Commission 15 months after the close of the public comment period, and the final rule will be published in the Federal Register one month after the staff requirements memorandum.

Mr. Weiss concluded by stating that the staff views this rulemaking as a necessary first step in providing an opportunity for licensees and NRC to be more efficient and effective in this regulatory environment.

NEI PRESENTATION ON PROPOSED REVISION TO 10 CFR 50.48

Mr. Fred Emerson, NEI, was then introduced to discuss the proposed rule from the industry perspective. Mr. Emerson stated that when the final NFPA 805 standard was approved in the fall of 2000, the industry still had some concerns related to the final rule and the final standard. These concerns were addressed in the rulemaking process. Specifically,

- The industry believed that there should be an allowance for the use of performed-based methods to address the deterministic requirements of Chapter 3. Chapter 3 of the standard specifically prohibits the use performed-based methods to address Chapter 3 requirements. The proposed rule provides an exception to allow the use of performance-based methods that have been approved by the staff.
- The industry also wanted to allow the use of licensing bases as previously docketed instead of the "previously approved alternatives" currently included in the language of Chapter 3.
- The industry wanted the NRC to review performed-based methods instead of the NFPA Technical Committee, and the staff has agreed to do so.

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

- NEI agreed to develop the implementing guidance for the rulemaking, and the development of this guidance is moving forward in parallel with the rulemaking. The implementing guidance is one of the vehicles for addressing issues as they arise during the rulemaking process. Other methods for addressing emergent issues during the rulemaking may include changes to the rule language directly and/or by placing the

information in the statements of consideration for the rule. Once the NRC has accepted the implementing guidance, it is anticipated that they would endorse it in a regulatory guide.

- There are four fundamental industry positions related to the proposed rule. The first position relates to the increased use of risk information in fire protection. The intent of the proposed rule is that a licensee can choose an alternate licensing basis. However, many licensees have a fire protection licensing basis with which they have been comfortable for the last 20 years. The industry believes that if a licensee chooses not to adopt NFPA 805, they should still have the ability to use risk-informed, performed-based tools in a structured regulatory environment. The industry views this as an evolutionary process where licensees may gradually utilize performance-based, risk-informed methods to make changes to their fire protection licensing bases. The second position is that the rulemaking should be optional. This has never been a contentious issue with the staff. The third position is that the transition to the NFPA 805 standard as a licensing basis should be uncomplicated. The transition process is of great interest to any licensee who is going to be contemplating changing licensing bases. And the fourth is that the licensee should have a thorough understanding of the licensing basis through the transition.
- The industry believes that licensees should be able to use NFPA 805 tools even if they do not transition to NFPA 805 as their licensing basis. Use of the NFPA 805 tools would not relieve a licensee of the requirement to obtain an exemption from the NRC to make a change to its licensing basis; however, the focus of the staff review would be on the results of the analysis and the applicability of the results to the plant, not on having the licensee justify the use of the tool used.
- The industry is generally positive about the current proposed rule language. They still have some concerns, but believe they will be addressed during the development of the final rule.
- The implementation guidance is currently under development by NEI. The major focus of the guidance is the transition process. The key elements of the guidance include what the process is, what are the licensee's options, guidance for licensees choosing to maintain their existing licensing basis with the possible use of NFPA 805 tools, guidance on adopting the new licensing basis, guidance of maintaining licensing basis configuration control once the transition has been made.
- The implementation guidance includes appendices on the use or interpretation of the provisions of NFPA 805 itself. Specifically, they contain such guidance as how to implement the program fundamentals, establish performance criteria, identify fire hazards in various systems structures and components, and perform an evaluation against the performance criteria. The schedule for completing the implementation guidance is in consistent with the rulemaking schedule.
- There are some potential barriers or hurdles. These need to be addressed during the development of the rule language and/or the implementation guidance. Examples of potential barrier issues include whether a license amendment is required for analytical methods, and the definition and use of the current licensing basis. An example of a

potential hurdle is that NFPA 805 requires some new elements that are not currently part of Appendix R, such as monitoring at shutdown and low power modes, these are classified as potential hurdles because the industry has not and must successfully do so to create a successful rule and matching implementation guidance.

- The major benefits of the proposed rule from the industry perspective include 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 to focus fire protection programs on those areas that are more risk-significant. Currently, this capability does not exist under Appendix R. The rule will provide a consistent method for supporting exemptions, deviations, 10 CFR 50.59 and GL 86-10 evaluations. The rule will provide a seamless transition process from the deterministic to the risk-informed regulatory framework. And finally, the use of fire risk methods, integrating consideration of fire risk into overall plant risk will help licensees resolve issues for fire protection on an equal risk basis when considered against other plant issues that are competing for resources.
- In response to a question from the Fire Protection Subcommittee, Mr. Emerson explored the issue of whether licensees would utilize the proposed rule. He believes that there are a few plants that are considering using this rulemaking. The plants that are most likely to use it are ones that are using risk techniques in their normal plant operations, and have established PRAs that they utilize. These plants will most likely be the first to adopt the new standard. Once the rest of the industry sees successful use and successful regulatory interactions, using risk tools in the fire area, Mr. Emerson believes that more plants will move to adopt the new standard as they see the benefits.

NRC STAFF PRESENTATION ON NEI 00-01

Following the NEI presentation on the proposed revision to 10 CFR 50.48, Mr. Weiss gave a presentation on NEI 00-01, "Post-Fire Safe-Shutdown Circuit Analysis." In his presentation, Mr. Weiss described the history of the issue, the staff's planned courses of action, the relationship of NEI 00-01 as a potential key element to resolving the circuit analysis issue, and the relationship of NEI 00-01 to the proposed revision to 10 CFR 50.48 risk-informed, performance-based fire protection rulemaking. He stated that the staff was specifically seeking the Subcommittee's comments and advice on NEI 00-01.

Specific highlights of Mr. Weiss's presentation include:

- NRC Information Notice 99-17, "Problems Associated with Post-Fire Safe-Shutdown Circuit Analysis," dated June 3, 1999, identified some issues relative to post-fire, safe-shutdown circuit analysis. In response, NEI undertook a voluntary industry initiative. As part of that initiative, they conducted special cable fire tests at Megapoint Laboratories to test the configuration and vulnerability of certain configurations of cable susceptibility to spurious actuations (and multiple spurious actuations). NEI is developing criteria based upon those test results for post-fire safe-shutdown circuit analysis.
- On November 29th, 2000, the NRC temporarily halted certain associated circuit inspections, pending completion of the industry initiative. In February 2001, NEI formed

an expert panel, tasked with the interpretation of the cable fire test results. On October 18th, 2001, NEI submitted Draft C of their circuit analysis methodology, NEI 00-01. In February 2002, the expert panel completed its efforts to interpret the cable fire test results, and on March 6th, 2002, NRR provided comments to NEI on their circuit analysis methodology, NEI 00-01.

- The proposed rule allowing the use of NFPA 805 is an important aspect of this issue because it lays the regulatory groundwork for adopting risk insights as a licensing basis.
- The staff is pursuing a number of courses of action, as well as, exploring some possible alternative actions. Specifically, the staff is preparing a NUREG in parallel with its review of NEI 00-01 to provide circuit analysis definitions, principles, illustrations, and practical methods for implementation of the resolution techniques. Alternatively, Appendix B to NFPA 805 addresses circuit analysis to some extent. The staff is considering whether it provides a viable option for resolution of the circuit analysis issue.
- The staff is considering different ways that it could employ NEI 00-01 in the final resolution. For instance, it could use applicable sections of the NEI document in its NUREG. Another option would be to endorse it, if applicable, in a regulatory guide.
- The staff has numerous comments on NEI 00-01, Draft Revision C (approximately 170 comments). The most significant staff comment is that the staff believes that the degree to which circuits can be screened from consideration depends in part upon the uncertainty associated with that methodology.

NEI PRESENTATION ON NEI 00-01

Mr. 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). In some test cases, no failures were observed, while in other cases, circuit failures were observed during the test. Shorts to ground and hot shorts resulting in device actuations occurred. Open circuits (NRC regulations require plants to consider these when performing a safe shutdown analysis) during the testing were not observed. The cable type significantly affects the likelihood of circuit failure, as do the number of cable layers in the cable tray (i.e., a single layer of cables or multiple layers), whether the cable is in tray or conduit, the tray 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 addition, the time to failure appeared to be longer in cases with more tray fill (perhaps due to thermal mass), and if the cables are in vertical trays. And finally, hot shorts were observed to be of shorter duration than shorts to ground.
- In response to a question from the Subcommittee, it was clarified that Mr. Emerson was presenting observations, not data analysis. Accordingly, the expert panel or the EPRI report may draw some slightly different conclusions following detailed analysis.
- Almost half of the circuit failures experienced in the tests lasted less than 30 seconds before being shorted to ground. Approximately 40 percent lasted between half a minute and three minutes, and the remainder lasted longer than three minutes. Blown fuses occurred more commonly than device actuations in the tests.
- The effect of water spray was considered by spraying the cables after they had been severely damaged to see if additional actuations occurred. In almost all of the 18 tests, additional actuations did not occur. The staff pointed out that the water tests were oriented towards causing additional actuations after most of the possible actuations had already occurred. They did not consider whether water could have accelerated or exacerbated the failures that already occurred.
- A panel of experts was utilized to determine the probabilities associated with circuit failures based on the test results utilizing a process which had previously been used for estimating seismic hazards. The panel's findings are documented in a report that is available from the EPRI. Each panel member's individual report is provided as an appendix to the overall EPRI report.
- NEI conducted two pilot evaluations (one on a boiling water reactor and one on a pressurized water reactor) of their circuit analysis methodology in NEI 00-01 to determine its usefulness. The staff has concerns about whether the NEI 00-01 methodology adequately addresses uncertainty. To address this concern, the pilot plants conducted sensitivity analyses to determine the likelihood that a scenario was inappropriately screened out of the analysis. In addition, the NEI methodology includes steps to consider safety margins and defense-in-depth. A scenario cannot be screened out of the analysis without considering these factors. The staff and NEI are still trying to reach agreement on the uncertainty issue.
- In general, NEI believes that based on the pilot applications, that the NEI 00-01 methodology is workable with a reasonable level of effort for each plant, and gives

results which are believable. The circuit analysis task force will make adjustments to optimize the methodology based on the feedback from the pilot plants.

- The staff had 170 comments on NEI 00-01, Draft Revision C. At the time of the Subcommittee meeting, NEI estimated that it was about six weeks away from completing its response to the staff's comments. Mr. Emerson stated that he believes that the staff's issues arise from a melding of deterministic and risk-informed methods for addressing circuit analysis. The melding of these two dissimilar types of methods to create a process with a useful synergy is somewhat difficult. The staff comments reflected the difficult nature of this task. He pointed out that the purpose of NEI 00-01 is to allow risk to be a useful tool in determining how much effort need be expended in resolving an issue. For example, in cases where there are clear compliance issues, the risk tools can be used to support an exemption request.

Mr. Kalantari of Engineering, Planning, and Management (EPM) provided some final thoughts. Specifically, he stated that he believed that open circuits did not occur in the EPRI tests because they tested at temperatures which did not exceed the melting point of copper. In addition, he pointed out that he believes that open circuits will occur during a real fire. For instance, falling objects impacting cable trays will cause open circuits. However, in general, he believes that open circuits should not cause problems.

SUBCOMMITTEE DECISIONS

The Subcommittee decided to recommend to the Full Committee that a letter be prepared at the June 6-8, 2002 ACRS meeting. The ACRS Chairman issued a letter report to the Commission on June 17, 2002, recommending that NRC staff proceed with issuing the proposed rule for public comment.

PRESENTATION SLIDES AND HANDOUTS PROVIDED DURING THE MEETING

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

BACKGROUND MATERIAL PROVIDED TO THE SUBCOMMITTEE:

1. Nuclear Energy Institute (NEI) guidance document NEI 00-01, "Guidance for Post-Fire Safe Shutdown Analysis," Draft C, dated October 2001.
2. Letter from Mr. John N. Hannon to Mr. Alex Marion, dated March 6, 2002 providing NRC Staff comments on Draft C of NEI 00-01, "Guidance for Post-Fire Safe Shutdown Analysis".
3. Memorandum from Gary M. Holahan to Karen D. Cyr, et.al, "Concurrence On Part 50 Proposed Rulemaking Package: Light Water Reactor Adoption of Risk-Informed, Performance-Based Fire Protection Requirements (NFPA 805)," dated May 8, 2002.
PROVIDED FOR INTERNAL ACRS USE ONLY.
4. National Fire Protection Association (NFPA) Standard 805, "Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition.

5. Letter from Dana A. Powers to Shirley Ann Jackson, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," dated February 18, 1999.

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).

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
FIRE PROTECTION SUBCOMMITTEE MEETING
NFPA 805 RULEMAKING/NEI 00-01 CIRCUIT ANALYSIS GUIDANCE DOCUMENT
 June 4, 2002
 ROCKVILLE, MARYLAND

- SCHEDULE -

<u>TOPIC</u>	<u>PRESENTER</u>	<u>TIME</u>
I. Opening Remarks	S. Rosen, ACRS	8:30-8:35 a.m.
II. Proposed Revision to 10 CFR 50.48 to permit voluntary adoption of NFPA 805 licensing basis for light water reactor fire protection requirements	E. Weiss, NRR	8:35-9:30 a.m.
III. Industry Perspective on Proposed Revision to 10CFR50.48	F. Emerson, NEI	9:30-10:30 a.m.
Break		10:30-10:45 a.m.
IV. Post-Fire Safe-Shutdown Circuit Analysis	E. Weiss, NRR	10:45-11:30 a.m.
V. NEI 00-01, "Guidance for Post-Fire Safe-Shutdown Analysis," Draft Revision C	F. Emerson, NEI	11:30-12:00 p.m.
Lunch		12:00-1:00 p.m.
VI. NEI Resolution of NRC Staff Comments	F. Emerson, NEI	1:00-3:00 p.m.
Break		3:00-3:15 p.m.
VII. Subcommittee Comments/Discussion	S. Rosen, ACRS	3:15-4:00 p.m.
VIII. Adjourn		4:00 p.m.

ACRS Contact: Rob Elliott
301-415-6927

NOTE:

Presentation time should not exceed 50 percent of the total time allotted for specific item. The remaining 50 percent of the time is reserved for discussion.

Number of copies of the presentation materials to be provided to the ACRS - 35

Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants" (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff and the Nuclear Energy Institute regarding the proposed rulemaking to endorse NFPA 805 fire protection standard, and related matters.

10:15 a.m.–11:15 a.m.: Generic Resolution of Voids in the Concrete Containment (Open)—The Committee will hear presentations by and hold discussions with representatives of the NRC staff regarding the generic resolution of the issue of voids in the concrete containment walls.

11:15 a.m.–12 Noon: Future ACRS Activities/Report of the Planning and Procedures Subcommittee (Open)—The Committee will discuss the recommendations of the Planning and Procedures Subcommittee regarding items proposed for consideration by the full Committee during future meetings. Also, it will hear a report of the Planning and Procedures Subcommittee on matters related to the conduct of ACRS business, and organizational and personnel matters relating to the ACRS.

12–12:15 p.m.: Reconciliation of ACRS Comments and Recommendations (Open)—The Committee will discuss the responses from the NRC Executive Director for Operations (EDO) to comments and recommendations included in recent ACRS reports and letters. The EDO responses are expected to be made available to the Committee prior to the meeting.

1:15 p.m.–7:15 p.m.: Proposed ACRS Reports (Open)—The Committee will discuss proposed ACRS reports.

Saturday, June 8, 2002

8:30 a.m.–10 a.m.: Proposed ACRS Reports (Open)—The Committee will continue its discussion of proposed ACRS reports.

10:15 a.m.–11:30 a.m.: Discussion of Topics for Meeting with the NRC Commissioners (Open)—The Committee will discuss topics for meeting with the NRC Commissioners, which is scheduled for July 10, 2002.

12:45 p.m.–1:45 p.m.: Format and Content of the 2003 ACRS Report on the NRC Safety Research Program (Open)—The Committee will discuss the format, content, schedule, and assignments for the 2003 ACRS report to the Commission on the NRC Safety Research Program.

1:45 p.m.–2:45 p.m.: Proposed papers for the Quadripartite Meeting (Open)—The Committee will discuss proposed technical papers on specific topics that

will be discussed at the Quadripartite meeting scheduled to be held on October 23–25, 2002, in Berlin, Germany.

2:45 p.m.–3:00 p.m.: Miscellaneous (Open)—The Committee will discuss matters related to the conduct of Committee activities and matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

Procedures for the conduct of and participation in ACRS meetings were published in the **Federal Register** on October 3, 2001 (66 FR 50462). In accordance with those procedures, oral or written views may be presented by members of the public, including representatives of the nuclear industry. Electronic recordings will be permitted only during the open portions of the meeting and questions may be asked only by members of the Committee, its consultants, and staff. Persons desiring to make oral statements should notify Dr. Sher Bahadur, ACRS, five days before the meeting, if possible, so that appropriate arrangements can be made to allow necessary time during the meeting for such statements. Use of still, motion picture, and television cameras during the meeting may be limited to selected portions of the meeting as determined by the Chairman. Information regarding the time to be set aside for this purpose may be obtained by contacting Dr. Sher Bahadur prior to the meeting. In view of the possibility that the schedule for ACRS meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should check with Dr. Sher Bahadur if such rescheduling would result in major inconvenience.

Further information regarding topics to be discussed, whether the meeting has been canceled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements, and the time allotted therefor can be obtained by contacting Dr. Sher Bahadur (telephone 301-415-0138), between 7:30 a.m. and 4:15 p.m., EDT.

ACRS meeting agenda, meeting transcripts, and letter reports are available through the NRC Public Document Room at pdr@nrc.gov, or by calling the PDR at 1-800-397-4209, or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS) which is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html>.

Videoteleconferencing service is available for observing open sessions of ACRS meetings. Those wishing to use this service for observing ACRS

meetings should contact Mr. Theron Brown, ACRS Audio Visual Technician (301-415-8066), between 7:30 a.m. and 3:45 p.m., EDT, at least 10 days before the meeting to ensure the availability of this service. Individuals or organizations requesting this service will be responsible for telephone line charges and for providing the equipment and facilities that they use to establish the videoteleconferencing link. The availability of videoteleconferencing services is not guaranteed.

Dated: May 10, 2002.

Andrew L. Bates,

Advisory Committee Management Officer.

[FR Doc. 02-12256 Filed 5-15-02; 8:45 am]

BILLING CODE 7590-01-P

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Reactor Safeguards; Subcommittee Meeting on Fire Protection; Notice of Meeting

The ACRS Subcommittee on Fire Protection will hold a meeting on June 4, 2002, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland.

The agenda for the subject meeting shall be as follows:

Tuesday, June 4, 2002—8:30 A.M. Until the Conclusion of Business

The Subcommittee will review (1) the proposed revision to 10 CFR 50.48 to endorse the National Fire Protection Association (NFPA) standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," and (2) the Nuclear Energy Institute (NEI) guidance document NEI 00-01, "Guidance for Post-Fire Safe-Shutdown Circuit Analysis". The purpose of this meeting is to gather information, analyze relevant issues and facts, and to formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman; written statements will be accepted and made available to the Committee. Electronic recordings will be permitted only during those portions of the meeting that are open to the public, and questions may be asked only by members of the Subcommittee, its consultants, and staff. Persons desiring to make oral statements should notify the cognizant ACRS staff engineer named below five days prior to the meeting, if possible, so that appropriate arrangements can be made.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
SUBCOMMITTEE MEETING ON FIRE PROTECTION

JUNE 4, 2002
Date

PLEASE PRINT

ATTENDEES PLEASE SIGN-IN FOR THE MEETING

<u>NAME</u>	<u>NRC ORGANIZATION</u>
ERIC WEISS	NRR/DSSA/SPLB
PAUL LAIN	NRR/DSSA/SPLB
John Hannon	NRR/DSSA/SPLB
Leon Whitney	NRR/DSSA/SPLB
June Cai	RES/DRAA/PRA
Kendra Hill	RES/DRAA/PRA
Suzanne Black	NRR/DSSA
Ed Connell	NRR/DSSA/SPC3
Steve West	NRR
Cris Gormes	NRR/ORIP/RPP
Gack Pamy	NRR/DSSA
J.S. Hyslop	RES/ORAB
Mark Henry Sallee	NRC/NRR/DSSA/SPLB
Phil Qualls	NRC
Ken Sullivan	NRC/BNL
John Biechman	NFPA

Risk-Informed, Performance-Based Fire Protection Implementing Guidance

Fred Emerson, NEI

Advisory Committee on Reactor Safeguards

June 7, 2002

1



Topics

- Background
- Industry positions
- Current rule language
- Implementing guidance
- Moving forward

2



Background

- Development of NFPA 805
 - Technical Committee on Nuclear Facilities
 - NRC and industry represented
 - Several year effort
 - Final product approved by NFPA in November 2000
 - Industry and NRC concerns over final product to be addressed in rulemaking

3



Background

- Industry agreed to support rulemaking when NRC addressed industry concerns:
 - Allow use of performance-based methods to address Chapter 3 fundamental elements
 - Allow “docketed licensing bases” (in lieu of “previously approved alternatives”) to supersede Chapter 3 elements
 - NRC review licensee proposed P/B methods instead of NFPA Technical Committee

4



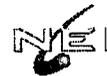
Background

- Industry agreed to develop implementing guidance for rulemaking
 - Vehicle for resolving some of the open issues
 - Others to be resolved in the rule language (exceptions to the standard)
- NRC will utilize in Regulatory Guide
- Multi-discipline contractor team developing
 - NEI Rulemaking ITF oversight
 - Frequent interaction with NRC
- Rule language an issue
 - Developing guidance in parallel with rule language



Industry Positions

- Increased use of risk information in fire protection regulation
 - Licensees should be able to use tools whether or not they transition to NFPA 805
- Rulemaking optional
- Uncomplicated transition
- Thorough understanding of licensing basis during transition



Use of Risk Information

- Vehicle for risk-informing fire protection regulation
- Tools must be available for use by all licensees
- Evolutionary process – seamless transition from partial to full use

7



Rulemaking Optional

- Optional implementation not an issue with NRC
- Rationale: Optional nature essential to promote use of risk information in fire protection

8



Uncomplicated Transition

- “Safe today = safe tomorrow”
- Clear guidance and well-understood process necessary
- Areas to be addressed
 - Document submittal requirements vs. retained documentation
 - License amendment submittal vs “50.59” supporting evaluation
 - Use of docketed licensing basis material to address Chapter 3 elements

9



Licensing Basis

- Thorough understanding of licensing basis throughout transition is essential
- Areas to be addressed in rule or guidance
 - Analysis/definition of licensing basis
 - Use of currently docketed licensing basis
 - Approval of RI/PB methods
 - Inspection and enforcement during transition

10



Current Rule Language

- Positive comments
 - Transition process clearer
- Concerns to be discussed with staff in moving forward
 - No allowance for P/B methods in Chapter 3
 - Some industry exceptions not yet addressed
 - License amendment for analytical methods

11



Implementing Guidance

- Main body of implementing guidance is process information. Key elements are:
 - Transition process and options
 - Guidance for adoption of a new licensing basis
 - Guidance for use within existing licensing basis
 - Configuration control

12



Implementing Guidance

- Appendices provide one or more methods for interpreting/using information in NFPA 805, such as
 - Establishing fire protection program fundamentals
 - Identification of performance criteria, fire hazards, and applicable SSCs
 - Evaluation against performance criteria
- Completion in parallel with issuing rule in late 2003
 - Partial first draft to be provided to NRC later this month

13



Potential Barriers

- Convergence of rule language, implementing guidance, and inspection guidance and training
- License amendment for use of analytical methods (SER preferred)
- Definition/use of current licensing basis
- Technical issues
 - Seismic 1E fire pumps
 - Seismic standpipes

14



Potential Hurdles

- Monitoring
- Shutdown and low power modes

15



Potential Benefits

- Resolution of current fire protection issues
- Address NRC 4 organizational goals
- Focus fire protection program on risk significant issues
- Consistent method for analysis
 - Exemptions, deviations, “50.59” and GL 86-10 evaluations
 - Seamless transition process from deterministic to risk-informed regulatory framework
- Resolve competing issues involving fire protection in a risk-informed manner

16



Moving Forward

- One scenario for utility use
 - First, better methods for fire PSAs
 - ANS fire PSA standard development
 - EPRI/RES fire PSA requantification project completion
 - Second, a few plants willing to utilize the NFPA 805 rulemaking
 - Plants with established PRAs and successful use of risk information in the past
 - Successful use of 805 tools in a few evaluations, then more widespread

17



Moving Forward

- One scenario
 - Third, with successful plant experience, more plants willing to use it
 - Improve plant fire PSA tools
 - Integrate fire risk with overall plant risk metric
 - Willing to apply risk information generally and for fire protection
- Eventually expect to see most plants using this to some degree, **IF**....

18



Moving Forward

- Industry and NRC, in the current rulemaking process
 - Remove barriers...
 - Lower hurdles...
 - Simplify process...
 - Optimize benefits...

in a manner consistent with sound regulatory practices



Resolution of Circuit Failures Issues: NEI 00-01

Fred Emerson, NEI

Advisory Committee on Reactor Safeguards
Fire Protection Subcommittee

June 4, 2002

1



Topics

- Status of industry resolution activities
 - Circuit failure testing
 - Expert panel probabilities determination
 - Pilot evaluations of NEI 00-01 methods
- Response to NRC comments on NEI 00-01

2



Circuit Failure Testing

- 18 tests completed in June 2001
 - Preliminary results reported at Fire Protection Information Forum in October, 2001
 - EPRI report in preparation
 - Results considered in expert panel deliberations

3



Circuit Failure Testing

- Observations
 - In some cases, no failures
 - Circuit failures observed
 - Shorts to ground (fuses blew)
 - Hot shorts (device actuations)
 - No open circuits

4



Circuit Failure Testing

- Observations
 - Circuit failure likelihood highly dependent on:
 - Cable type (armor, insulation, jacket material)
 - Tray fill
 - Tray vs conduit
 - Tray orientation
 - Both time and temperature

5



Circuit Failure Testing

- Observations
 - Time:
 - TTF (time to failure) typically > 30 minutes
 - TTF longer:
 - For thermoset and armored cable
 - With greater tray fill
 - For vertical trays
 - In conduit
 - Hot shorts typically of short duration, then shorted to ground

6



Circuit Failure Testing

- Observations
 - Blown fuses more likely than device actuations; relative likelihood affected by:
 - Circuit design
 - Grounding of tray, conduit, or armor
 - Water spray only once resulted in additional circuit failures
 - Conductor-to-conductor shorts:
 - More likely than cable-to-cable shorts
 - Occur prior to cable-to-cable shorts

7



Expert Panel

- Process
- Results

8



Expert Panel Process

- Project funded by EPRI
- Utilized SSHAC (Senior Seismic Hazard Analysis Committee) methodology from NUREG/CR-6372
 - Technical Integrator responsible for determining probabilities
 - Panel of experts representing appropriate disciplines provided input to TI
 - Two peer reviewers

9



Expert Panel Process

- 1: Identify participants
 - TI - Robert Budnitz
 - Peer reviewers
 - Neil Todreas, MIT
 - Dennis Henneke, Duke Energy

10



Expert Panel Process

- Participants
 - Panelists (* indicates those providing reports)
 - Kent Brown, TVA (cable, testing)
 - Jeff Circle, Entergy (PSA)
 - * Dan Funk, Edan (safe shutdown, electrical, cable)
 - * Harvey Leake, APS (safe shutdown)
 - * Fred Mowrer, UMD (fire, testing)
 - * Steve Nowlen, Sandia (fire, testing)
 - Tom O'Connor, Amergen (fire protection)
 - * Gareth Parry, NRC (PSA)
 - * Mark Salley, NRC (fire protection, testing)
 - * Brady Williamson, UCB (fire, testing) ¹¹



Expert Panel Process

- 2: Disseminate technical information
- 3: Agree on formulation of technical question
- 4: Panelists review and evaluate technical information
- 5: TI evaluate and integrate panelist input
- 6: TI circulate draft evaluation for comment
- 7: TI issue final report
- 8: Peer reviewers issue reports



Expert Panel Process

- Information considered
 - Omega Point test report and data (extensive)
 - Sandia report of NRC testing conducted in conjunction with industry tests
 - Sandia Report “Circuit Analysis - Failure Mode and Likelihood Analysis”
 - EPRI/NEI test plan
 - Cable materials information supplied by EPRI/NEI

13



Expert Panel Process

- Technical questions
 - Under what conditions could a serious fire affecting cabling in a nuclear power plant cause the spurious actuation of electrical/electronic circuits that could affect the plant’s safety?
 - What is the probability of such actuation conditional on those conditions?

14



Expert Panel Process

- PRA formulation

$$\Delta CDF = F_f * P_E * P_{SA} * P_{AS} * P_{DM} * \Delta P_{CCD} \text{ (per r.y.)}$$

F_f = frequency of any size fire

P_E = fire size parameter (more realistic location and size)

P_{SA} = probability of spurious actuations given substantial insulation damage

P_{AS} = probability that automatic suppression won't control the fire

P_{DM} = probability that detection and manual suppression won't control the fire

ΔP_{CCD} = change in conditional probability of core damage given fire-induced failure(s)

15



Expert Panel Process

- Panelists agreed to break down P_{SA} into

$$P_{SA} = P_{CD} * P_{SACD}$$

P_{CD} = probability of cable damage

P_{SACD} = probability of spurious actuation given cable damage

16



Expert Panel Results

- Base Case
 - Thermoset control cables
 - Un-armored cables
 - Single layer in horizontal tray
 - Target cables in hot gas layer (not plume)
 - Motor starter circuit includes control power transformer (normal plant configuration)
 - Gradual heatup of cables

17



Expert Panel Results

- Variants
 - Thermoplastic cable
 - Armored cable
 - Cable in conduit
 - Circuit not including control power transformer

18



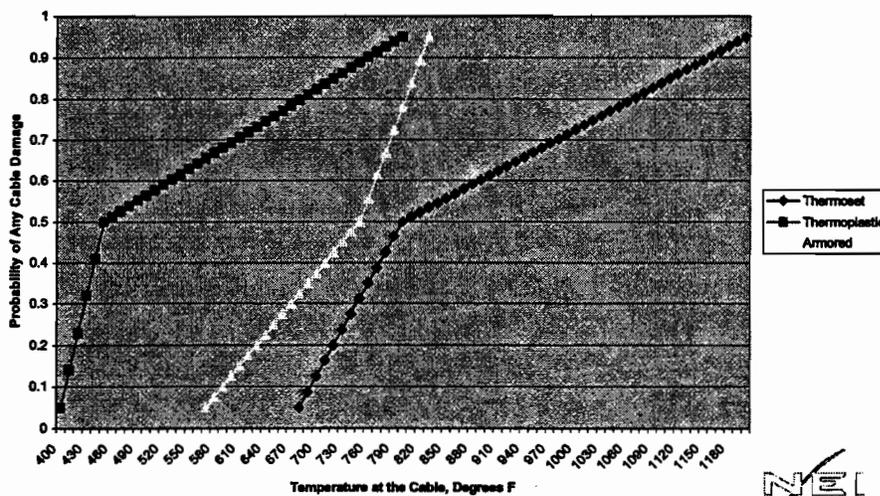
Implementing Guidance Outline

6. Guidance for adoption of a new licensing basis
7. Guidance for use within existing licensing basis
8. Configuration control
9. References

19



Fragility Curves



20



Expert Panel Results (Base Case)

Base Case Parameter	Description	Best Estimate	High Confidence Range
P_{SACD}	M/C, Intra-cable	.30	.10 - .50
P_{SACD}	1/C, Inter-cable	.20	.05 - .30
P_{SACD}	M/C - 1/C, inter-cable	.10	.05 - .20
P_{SACD}	M/C - M/C inter-cable	.01 - .05	—

21



Expert Panel Results

- Other parameters affecting probabilities
 - Plume vs. hot gas layer
 - Tray fill and cable location in tray
 - Vertical vs. horizontal tray
 - Water spray
 - Circuit parameters

22



Expert Panel Results

- NEI Circuit Failures Issue Task Force to consider next week:
 - How to use the expert panel results in NEI 00-01
 - How to address test observations not reflected in expert panel results, including
 - Time to failure
 - Tray fill
 - Plume vs. hot gas layer
 - Vertical vs. horizontal trays

23



Pilot Evaluations of NEI 00-01

- Evaluations conducted at two plants
 - McGuire (PWR)
 - Duane Arnold (BWR)
- Final report expected soon
- Intended to test usefulness of NEI 00-01 methods for determining risk significance of potential circuit failures

24



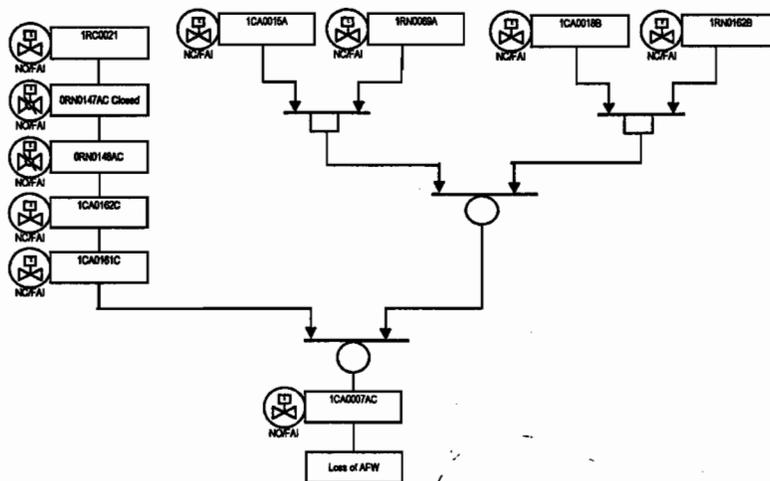
McGuire Pilot – Introduction

- 3 types of circuit failure scenarios:
 - Previously identified in the McGuire triennial inspection (3)
 - Review of FHA and design basis documents
 - McGuire FHA Logic Diagrams were key
 - Review and manipulation of McGuire PRA
 - Ten total scenarios selected:
 - Typically 3-5 Fire Areas per scenario
 - Many scenarios included multiple components and sub-scenarios (e.g., traced both PORV cables when only needed 1 PORV to open)
 - 2 to 3 circuit failures per scenario

25



Example McGuire Logic Diagram



26



PRA Input to Circuit Selection

- First need to determine types of components and basic events subject to spurious operation (MOVs, PORVs, etc.)
- Review existing fire PRA results to look for combinations of fire-induced failures and spurious operation
- Run PRA cases with selected PRA basic events set to 1.0

27



PRA Input (Continued)

- PRA can identify hundreds of thousands of possible combinations
- No initial indication if component cables are routed in same fire areas
- Some limiting combinations can be identified:
 - Fewest failures required for a scenario
 - Highest conditional CDF
 - Need to review final results to see if combinations remain limiting

28



McGuire Pilot Results

- All scenarios deterministically OK
- 30% of scenarios screen qualitatively
- 50% of remaining scenarios screen in steps 1-4 of the quantitative screening
- 70% of the screen 5 (detailed analysis) scenarios screen at less than $1E-07$ CDF
- 3 unscreened scenarios are in the control room:
 - McGuire lacks a detailed Control Room Fire PRA
 - All initially calculate between $1E-06$ and $1E-07$ CDF

29



McGuire Pilot Results

- Sensitivity analysis recommended considering 1 screened scenario as unscreened
- Pilot application showed NEI 00-01 method worked and is easily applied
- Feedback from pilot application is being incorporated into NEI 00-01

30



NRC Comments on NEI 00-01

- Industry currently preparing responses to 170 comments
- Expect to respond to staff within 6 weeks

31



NRC Comments on NEI 00-01

- General categories of comments
 - General comments
 - Comments on deterministic methods
 - Comments on probabilistic methods
 - Comments on safety margins/defense-in-depth analysis

32



Industry Response

- Responses
 - Agree, change document
 - Disagree, provide justification
 - Clarify, change document

33



Industry Response

- Most significant issues to be resolved
 - Application of risk significance tools, along with Safety Margins and Defense-In Depth considerations, to deterministic analysis
 - Need for “vulnerability search” for potential circuit failure combinations
 - Whether NEI 00-01 comment resolution should be the forum to resolve new issues with deterministic circuit analysis

34





Post-Fire Safe-Shutdown Circuit Analysis

Briefing for the ACRS Fire
Protection Subcommittee

Eric Weiss, Chief
Fire Protection Section, NRR
415-3264

June 4, 2002

Purpose

- To briefly describe history of issue
- Outline Objective, Alternatives and Planned Course of Action
- Introduce NEI 00-01 as potential key element to circuit analysis resolution
- Explain relationship of RI/PB FP rulemaking
- Seek ACRS comment/advice on NEI 00-01

HISTORY

- June 3, 1999, the NRC IN 99-17 “Problems Associated with Post-Fire Safe-Shutdown Circuit Analysis.”
- Voluntary initiative led by NEI
 - ◆ special cable fire tests and
 - ◆ developing criteria (based on the test results) for post-fire safe-shutdown circuit analysis.
- November 29, 2000, the NRC temporarily halted certain associated circuit inspection activities pending completion of the industry initiative.

HISTORY (Continued)

- February 2001, NEI formed an expert panel with the task of interpreting results of the cable fire tests.
- October 18, 2001 NEI 00-01 Draft C to NRC
- February 2002, expert panel completes their efforts on interpreting results of the cable fire tests.
- March 6, 2002 NRR comments on NEI 00-01

Objectives

- To clarify regulatory positions that maintain safety and to train inspectors accordingly (with due consideration of potential for backfit).
- To re-institute inspections to enhance public confidence
- To acknowledge effective and efficient strategies
- To facilitate use of risk insights to reduce unnecessary regulatory burden (NFPA 805 rulemaking)

Alternatives/Courses of Action

- Develop NUREG
 - ◆ Definitions
 - ◆ Principles
 - ◆ Illustrations
 - ◆ Practical Implementations of resolution techniques
- Appendix B, NFPA 805
- Employ NEI 00-01
 - ◆ Use applicable sections in NUREG
 - ◆ Focus Inspections on Risk Significant Areas
 - ◆ Prioritize Corrective Actions
 - ◆ Color SDP findings
 - ◆ Endorse in Reg Guide
 - ◆ NFPA 805 Rule Process

Deterministic vs. RI/PB

- Appendix R, 10 CFR 50 is a deterministic approach that may not permit much use of risk screening outside the exemption process,
- NFPA 805 is a Risk-Informed Performance-Based (RI/PB) approach which if endorsed in the regulations would permit more latitude in use of NEI 00-01.

RISK SCREENING

- The degree to which circuits can be screened from consideration depends in part on confidence/uncertainty associated with the methodology

ACRS Comment/Advice

- The staff would appreciate any advice but in particular the staff would appreciate comment on the following:
 - ◆ Which purposes contemplated for use of NEI 00-01 by staff are appropriate given its current level of refinement?(slide 6)
 - ◆ What needs to be done, if anything, to improve NEI 00-01 so that it can be used for those purposes?
 - ◆ Are there other purposes for NEI 00-01 ACRS would recommend?



NFPA 805 RULEMAKING

Briefing for the ACRS

Eric Weiss, Chief

Fire Protection Section, NRR

415-3264

NFPA 805 - Performance-Based Standard for Fire Protection for LWRs

- Background
- Advantages of Endorsing NFPA 805
- NFPA 805 Structure
- Rule Structure
- Major Issues
- Status of Rulemaking
- What this means

NFPA 805 - Background

- 10CFR 50 Appendix R – deterministic regulation
- ACRS Letter Feb 18, 1999
- Comprehensive Reg Guide 1.189 recently issued
- RI/PB National Consensus Standard Published Feb 2001
- Approved by the ANSI

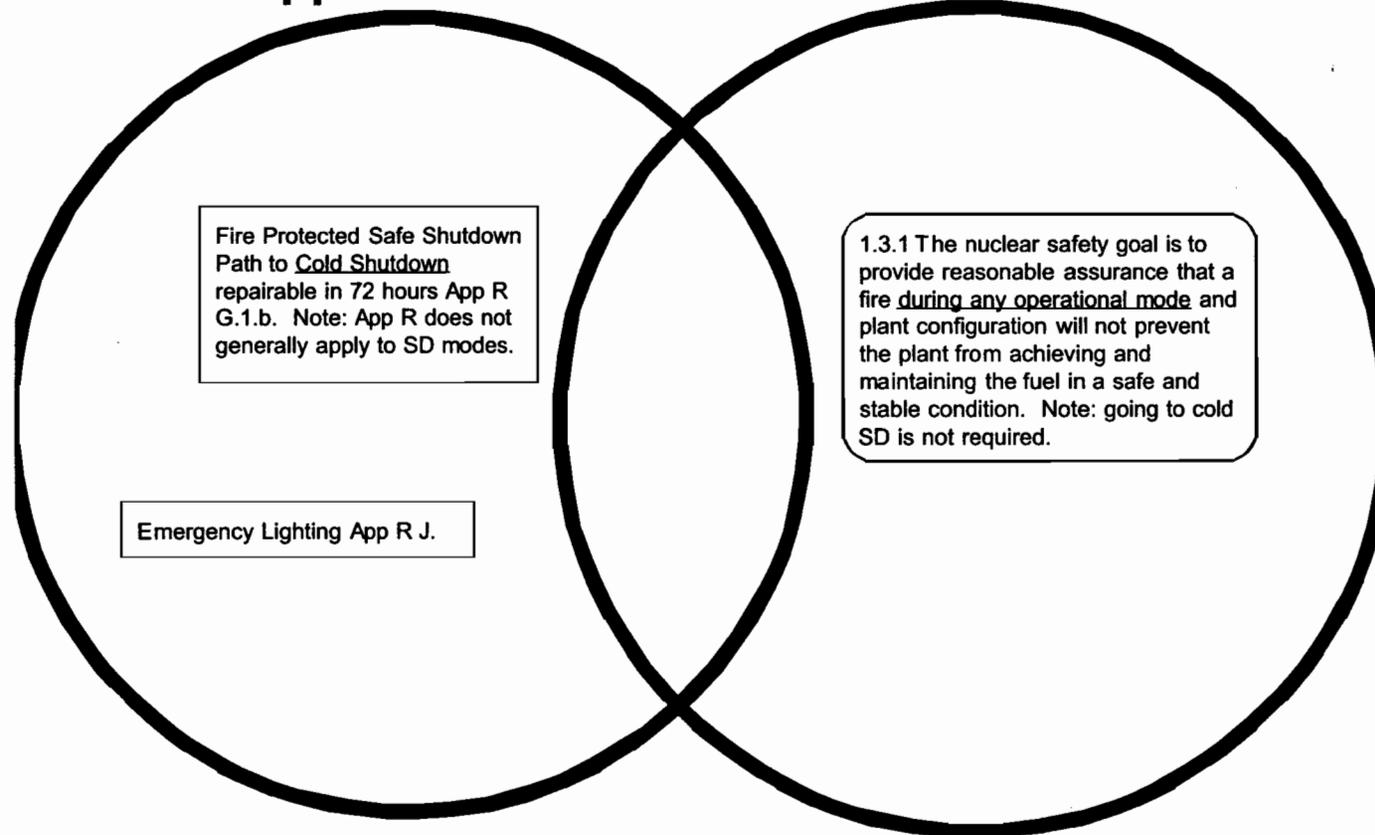
NFPA 805 – Background (Continued)

- Rule to endorse consistent with National Technology Transfer and Advancement Act (PL 104-113) and OMB Circular A119
- Takes advantages of advances in PRA and Fire Science since Appendix R was issued over 20 years ago
- Some Methods of Achieving Fire Safety are different than Appendix R

NFPA 805 – Background (Continued)

Appendix R

NFPA 805



Advantages

- Allows licensees to maintain safety through more flexible, efficient, and rational processes
- Reduces exemptions, submittals, and reviews
- Allows use of risk insights and fire modeling, science, and engineering
- Consistent with NRC's Outcome Goals
- Allows Licensees to focus FP program on most safety significant issues

NFPA 805 Structure

- Allows transition of existing Appendix R licensing basis including existing exemptions and GL86-10 equivalencies
- Allows future changes to plant and licensing basis to be either Deterministic or RI/PB
- Incorporates a change control process to monitor risk
- New RI/PB methods to be approved by the NRR

NFPA 805 Structure (Continued)

- NFPA 805 allows either a deterministic or a RI/PB approach (see NFPA 805 figure 2.2 “Methodology”)
- Deterministic Requirements similar to Appendix R (see NFPA 805 figure 4.2.2)
 - ◆ 3-hour encapsulation of one success path
 - ◆ 1-hour encapsulation of one success path with suppression and detection
 - ◆ 20ft of separation without intervening combustibles and suppression and detection throughout the area

NFPA 805 Structure (Continued)

- NFPA 805 Chapter 3 “Fundamental Fire Protection Elements”
 - ◆ Fire Protection Plan
 - ◆ Prevention (e.g. control of combustibles)
 - ◆ Fire Brigade
 - ◆ Water Supply
 - ◆ Standpipes and Hose Stations
 - ◆ Fire Extinguishers
 - ◆ Fire Alarm and Detection Systems
 - ◆ Automatic and Manual Water-based Fire Suppression Systems
 - ◆ Gaseous Fire Suppression Systems
 - ◆ Passive Fire Suppression (e.g. Building separation, Fire Barriers, Penetrations)

Rule Structure

- Amendment of 50.48 to allow use of NFPA 805
- Adoption is voluntary
- Existing Licensing Basis, Configuration and Procedures convey to new RI/PB environment
- Licensees document and retain records on site
- ROP monitors future changes
- Allows NRC to approve new RI/PB methods in the future
- Licensees may use NFPA 805 appendices

Major Points

- One of the NRC's first RI/PB rules
- NEI endorsed rulemaking in September 2001
- Key to successful implementation is appropriate regulatory guidance
- NEI agreed to develop guidance document by 2003 (first draft June 2002)
- NFPA 805 addresses existing LWRs
- NFPA 804 addresses Advanced LWRs
- Future NFPA std to address Advanced LWR and Gas Reactors in RI/PB manner

Schedule

- Proposed Rule to ACRS and CRGR
June 2002
- Proposed Rule to Commission July 2002
- Proposed Rule Published in FR for
Comment one month after SRM
- Final Rule to Commission 15 months
after close of public comments on
Proposed Rule
- Final Rule Published in FR one month
after SRM

What This Means

- This moves Fire Protection into Risk-Informed Performance Based Arena
- This represents an opportunity to improve the efficiency and effectiveness of NRC's regulatory environment

The following is the current draft proposed rule language which updates the draft proposed rule wording published in the *Federal Register* on April 2, 2002. This language is preliminary and may be incomplete in one or more aspects. NRC may post additional updates periodically on the rulemaking website.

Questions regarding this language can be directed to Leon Whitney, NFPA 805 Task Manager, (301) 415-3081, lew1@nrc.gov.

§ 50.48. Fire protection.

* * * * *
(c) *National Fire Protection Standard NFPA 805.*

(1) *Approval of incorporation by reference.* National Fire Protection Association (NFPA) Standard 805, "Performance-Based for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition" (NFPA 805), which is referenced in this section, was approved for incorporation by reference by the Director of the Federal Register. A notice of any changes made to the material incorporated by reference will be published in the Federal Register. Copies of NFPA 805 may be purchased from the NFPA Customer Service Department, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101 and in PDF format through the NFPA Online Catalog (www.nfpa.org) or by calling 1-800-344-3555 or 617-770-3000. Copies are also available for inspection at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, Maryland 20852-2738, and at the NRC Public Document Room, Building One White Flint North, Room O1-F15, 11555 Rockville Pike, Rockville, Maryland 20852-2738. Copies are also available at the Office of the Federal Register, 800 N. Capitol Street, Suite 700, Washington, DC.

(2) *Exceptions, modifications, and supplementation of NFPA 805.* As used in this section, references to NFPA 805 are to the 2001 Edition, with the following exceptions, modifications, and supplementations:

(i) *Life Safety Goal.* The Life Safety Goal of Section 1.3.3 is not endorsed.

(ii) *Plant Damage/Business Interruption Objectives.* The Plant Damage/Business Interruption Objectives of Section 1.3.4 of NFPA 805 are not endorsed.

(iii) *Use of Feed-and-Bleed.* In demonstrating compliance with the performance criteria of Sections 1.5.1(b) and (c) of NFPA 805, a high pressure charging/injection pump coupled with the pressurizer power-operated relief valves (PORVs) as the sole fire-protected safe shutdown path for maintaining reactor coolant inventory, pressure control, and decay heat removal capability (i.e., feed-and-bleed) for pressurized-water reactors (PWRs) is not permitted.

(iv) *Uncertainty Analysis.* An uncertainty analysis performed in accordance with Section 2.7.3.5 is not required to support deterministic approach calculations.

(v) *Existing Cables.* In lieu of installing cables meeting flame propagation tests as required by Section 3.3.5.3 of the standard, a flame retardant coating may be applied to the electric cables, or an automatic fixed fire suppression system may be installed to provide an equivalent level of protection." In addition, the italicized exception to Section 3.3.5.3 is not endorsed.

(vi) *Water Supply and Distribution.* The italicized exception to Section 3.6.4 is not endorsed.

(3) *Compliance with NFPA 805.*

(i) A licensee may maintain a fire protection program that complies with NFPA 805 as an alternative to complying with paragraph (b) of this section for plants licensed to operate