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

July 26, 2004

MEMORANDUM TO: ACRS Members

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

SUBJECT: CERTIFICATION OF THE ACRS FIRE PROTECTION SUBCOMMITTEE MEETING SUMMARY MINUTES, APRIL 23, 2004 - ROCKVILLE, MARYLAND

The minutes of the subject meeting, issued on July 21, 2004 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
H. Larson
S. Duraiswamy

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

July 21, 2004

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

FROM: Marvin D. Sykes, Senior Staff Engineer, ACRS

SUBJECT: WORKING COPY OF THE ACRS FIRE PROTECTION SUBCOMMITTEE MEETING SUMMARY MINUTES, APRIL 23, 2004 - 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 earliest 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
H. Larson
S. Duraiswamy
ACRS File

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

MEMORANDUM TO: Marvin D. Sykes, Senior Staff Engineer, ACRS

FROM: Stephen L. Rosen, Chairman
Fire Protection Subcommittee

SUBJECT: CERTIFICATION OF THE ACRS FIRE PROTECTION SUBCOMMITTEE MEETING SUMMARY MINUTES, APRIL 23, 2004 - ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on April 23, 2004, are an accurate record of the proceedings for that meeting.

Stephen L. Rosen July 23, 2004

Stephen L. Rosen, Date
Fire Protection Subcommittee Chairman

CERTIFIED
by Stephen Rosen on 7/26/04
Issued: 7/21/04

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF ACRS FIRE PROTECTION SUBCOMMITTEE MEETING
APRIL 23, 2004
ROCKVILLE, MARYLAND

On April 23, 2004, the ACRS Fire Protection Subcommittee held a meeting in Room T-2B3, 11545 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss three NRC fire protection initiatives. The items discussed included resolution of post-fire circuit analysis issues, proposed issuance of the revised Fire SDP, and the RES/EPRI Fire Risk Requantification Study. The staff also provided status updates on post-fire operator manual action rulemaking and issuance of the final rule revising 10 CFR 50.48 to allow voluntary adoption of NFPA 805 to satisfy existing regulatory requirements.

The meeting was open to the public. No written comments or requests to make oral statements were received from members of the public related to this meeting. Mr. Marvin Sykes was the Designated Federal Official for this meeting. The meeting was convened at 8:30 a.m. and adjourned at 3:55 p.m. on March 26, 2004.

ATTENDEES:

ACRS MEMBERS/CONSULTANTS/STAFF

Stephen Rosen, Chairman	Dana Powers, Member
Graham Wallis, Member	Graham Leitch, Member
John Sieber, Member	Marvin Sykes, ACRS Staff

ATTENDEES

Suzanne Black, NRR	John Hannon, NRR
Dan Frumkin, NRR	Raymond Gallucci, NRR
David Lew, RES	Eileen McKenna, NRR
Mark Reinhart, NRR	Sunil Weerakkody, NRR

Steve Nowlen, Sandia National Laboratory
Bijan Najafi, Electric Power Research Institute (EPRI)
Paul Gunter, Nuclear Information Resource Service (NIRS)
Alex Marion, Nuclear Energy Institute (NEI)

The presentation materials and handouts used during the meeting and a complete list of attendees is attached to the Office Copy of these Minutes. The presentation to the Subcommittee is summarized below.

Opening Remarks (Subcommittee Chair)
Mr. Stephen Rosen, Chairman of the Subcommittee on Fire Protection convened the meeting by providing introductory remarks. He also stated that the purpose of the meeting was to discuss staff resolution of post-fire safe shutdown circuit analysis issues, revisions to the Fire Protection SDP, and the ongoing fire risk requantification study. He later introduced Ms. Suzanne Black of the Office of Nuclear Reactor Regulation (NRR). Ms. Black briefly introduced the NRC staff involved in the presentations and called on Mr. Sunil Weerakkody to begin the

presentations. Mr. Weerakkody prefaced the presentations by discussing how the staff has worked closely with the industry and the staff's commitment to resolve fire protection issues expeditiously and introduced Mr. Mark Salley to discuss the resolution of post-fire safe shutdown circuit analysis issues.

Resolution of Post-Fire Safe Shutdown Circuit Analysis Issues

Mark Salley began the presentation by providing background information on the subject. He noted that 10 CFR 50 Appendix R requires licensees to assure that fire-induced circuit failures that could prevent safe shutdown will not occur. Information Notice 99-17 described instances at a number of licensed power facilities where this required assurance was called into question. In November 2000, NRC suspended inspections of "associated circuits" while the industry performed a series of fire tests to obtain data on expected failure modes of multi-conductor thermosetting and thermoplastic cables. After the analyses and a facilitated public workshop, a consensus on the most risk-significant cable configurations and attributes was reached. In January 2004, Draft NUREG-1778, "Knowledge Base for Post-Fire Safe-Shutdown Analysis" was issued for public comment. The staff has invited ACRS to comment as well.

The staff issued RIS 2004-03, "Risk-Informed Approach for Post-Fire Safe-Shutdown Associated Circuit Inspections" on March 2, 2004 to inform the industry of the risk-informed approach that will be used by the NRC to perform post-fire safe-shutdown associated circuit inspections. The approach concentrates on associated circuits with a relatively high probability of failing and whose failure could cause flow diversion, loss of coolant, or other scenarios that could significantly impact the ability to achieve and maintain hot shutdown. The RIS also notes that inspectors will pay particular attention to associated circuit failures that cause events to occur in the first hour of the fire. The inspectors will consider credible fire scenarios that could produce a thermal insult and potential cable damage. The initial focus of the inspection will be on conductor-to-conductor shorts within a multiconductor cable since the testing indicated that intra-cable shorting is the most probable cause of spurious actuations. Thermoplastic-cable-to-thermoplastic-cable interactions are also probable and should be considered. Inspectors will assume fire damage to no more than two separate cables for each scenario evaluated involving multiple spurious actuations. Fire damage to cables that could initiate other equipment failure modes, such as loss of function, must also be considered.

Mr. Salley stated that prior to resuming inspections, the staff plans to complete the development of necessary inspection procedures, SDP revisions, and changes to the reactor oversight process and enforcement guidance. Current plans provide for completion of these activities by June 2004, and resumption of inspections by December 2004.

Alex Marion, NEI made a brief presentation in which he described the industry's efforts to cooperate with the staff to develop a guidance document (NEI-00-01) that utilities could use to evaluate associated circuit issues at their plants and deal with the results of the evaluation. The document established two approaches for evaluating compliance with the existing regulations based fundamentally on the approved plant-specific licensing basis. Mr. Marion stressed that the industry believes that this document is a useful tool and should be endorsed by the NRC so that licensees can have some level of confidence and understanding of what is acceptable to the NRC. Otherwise, Mr. Marion noted that the two years of developmental work has been wasted. Mr. Marion also discussed proposed pilot self examinations at several plants prior to resumption of inspections using NEI-00-01 that NEI believes will demonstrate to the staff the relevance of this guidance document.

Paul Gunter, Nuclear Information Resource Service (NIRS) presented a question to the staff and expressed his opinion that the problems stem from what he viewed as the NRC's "regulatory contortion" in dealing with 10 CFR 50 Appendix R, Section III.G.2.

Revised Fire Protection Significance Determination Process

Mark Reinhart, NRR began the next presentation by discussing the development of a revised Fire SDP for use by inspectors when fire issues are identified. The revised Fire SDP was designed to provide NRC analysts and management with a risk-informed tool for identifying potentially risk-significant issues that involve degradations in the plant fire protection program. The issues are evaluated in terms of their impact on the change in fire-induced CDF. The SDP also helps to facilitate communication of the basis for significance between the NRC and regulated licensees and distinguishes findings that do not warrant further NRC engagement, due to very low risk significance. He emphasized that the staff had worked closely with the industry to develop an SDP that used more state-of-the-practice risk tools.

Mr. Reinhart noted that in the process of simplifying existing fire PRA methods for use in the SDP analysis, compromises in analysis complexity were made. The current process strives to achieve an order of magnitude estimate of risk significance and strives to minimize the occurrence of false negative findings. He also presented a chronological history of activities that had been completed and schedules for final issuance and implementation of the revised SDP.

Dan Frumkin provided a simple tutorial on the use of the revised SDP by demonstrating the steps that an inspector would be expected to exercise, from the initial screening of the issue to the final quantification of risk. The SDP uses fire risk factors to screen issues to green and for those issues that do not screen to green, the SDP uses different quantitative delta CDF screening criteria for individual aspects of a licensee's fire protection program (e.g., Fire Prevention and Administrative Controls 1E-4, Fixed Fire Protection Systems 1E-5 etc.). The SDP also incorporates the use of fire dynamics tools to evaluate the effects of non-screened fires and incorporates manual action worksheets that consider performance-shaping factors appropriate for manual responders in fire environments. Use of the revised SDP is expected to begin June 2004. Guidance for assessing risk significance of fire protection issues during low power or shutdown operations are currently not addressed in this SDP.

Alex Marion of NEI supported the use of the new SDP by complimenting the staff for maintaining good communications during the development of the revised SDP and he stated that the industry views the new SDP's technical adequacy to be much better than the previous version. Mr. Marion expressed concern with the the application of the SDP by inspectors and the capability of the SDP for addressing circuit failure and manual actions issues.

Fire Risk Requantification

J.S. Hyslop, RES described the cooperative effort between the NRC's Office of Nuclear Regulatory Research, EPRI, and 10 North American utilities to develop improved guidance for conducting fire risk analysis (FRA) for nuclear power plants; to develop state-of-the-practice fire risk estimates which reflect this guidance; to determine the qualitative and quantitative impact of this guidance on fire risk; to understand the strengths and weaknesses of this guidance; and to transfer the technology. The work is being performed by Science Applications International Corporation (SAIC) and Sandia National Laboratories (SNL). The staff expects that these improvements will directly advance the overall FRA approach of qualitative screening,

quantitative screening, and detailed analysis enabling analysts to perform FRA more efficiently. Mr. Hyslop also noted that RES has ongoing supplemental studies which support the development of more comprehensive fire PRAs. These studies are focused on fire ignition frequencies, fire modeling, and modeling of post-fire safe shutdown in fire PRA.

The NRC is also involved in the American Nuclear Society (ANS) Fire PRA Committee which is coordinating the development of the ANS Fire PRA Standard. This standard is expected to mimic the requantification steps, where possible. Publication of the ANS standard is expected Fall 2004.

The effort will be piloted at D.C. Cook and Millstone 3. It is expected that the improved FRA techniques will provide guidance for risk-informed analyses, become the basis for review by NRC of NFPA 805- related changes and support development of the ANS fire risk standard. Improvements are also expected in fire data and ignition frequency, fire modeling, systems and circuit analyses and human reliability analyses. A draft report is scheduled for June 2004 with a joint EPRI/NRC workshop tentatively scheduled for 1st quarter 2005. A feasibility study to extend the work to fire risk analyses of low power and shutdown is nearing completion.

Operator Manual Actions Rulemaking

Raymond Gallucci, NRR presented a status update on the staff's effort to revise 10 CFR 50, Appendix R, Paragraph III.G.2. to allow the use of operator manual actions as an acceptable method to protect at least one shutdown train during a fire when redundant trains are located in the same fire area. According to Mr. Gallucci, the revised rule will allow licensee to use certain operator manual actions in lieu of establishing a 1-hour fire barrier or 20 feet of separation in situations where fire detection and automatic suppression systems are available.

Mr. Gallucci presented a brief history of the issues that lead to the rulemaking and discussed the staff's approach to resolve the issues including the development of operator manual action acceptance criteria. The acceptance criteria were established for determining the feasibility and reliability of manual operator actions for post-fire safe shutdown. Mr. Gallucci also summarized the staff's plans for issuance of the final rule.

Alex Marion, NEI and Paul Gunter, NIRS expressed concern and questioned the benefits of this rulemaking effort. Mr. Marion so commented that one of the early goals of the rulemaking, to reduce the need for exemptions, would not be achieved with this provision in the rule i.e. allows for the use of manual action only in fire areas where detection and automatic suppression systems are available.

10CFR 50.48 –NFPA 805 Rulemaking Status

Bob Radlinski, NRR provided a status update on the 10 CFR 50.48 Rulemaking. The revised rule would allow licensees to voluntarily adopt NPPA 805 to satisfy existing fire protection requirements. Licensee's may voluntarily implement a performance-based, risk-informed fire protection program in-lieu of the deterministic rule now in place. The ACRS endorsed the final rule by letter to the Commission December 2003. The Commission action is pending.

Mr. Radlinski mentioned industry's development of NEI 04-02, Revision E "Guidance for Implementing A Risk-Informed, Performance-Based Fire Protection Program Under 10CFR50.48(c)" that was recently submitted for NRC staff review. The staff review is ongoing and a public meeting is scheduled for April 29, 2004 to discuss the issues with NEI. If

agreement is reached on this revision of the guide, the staff hopes to be able to endorse NEI-04-02 in a Regulatory Guide and issue a first draft in the Summer of 2004.

Mr. Radlinski also discussed the staff activities to revise the inspection procedures and provide inspector training prior to plant implementation of an NFPA 805 program. The staff does not expect that the change in inspection scope will have a significant impact on current inspection resources since licensees will be tasked with performing detailed plant-wide evaluations before converting to an NFPA 805 program.

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MEETING OF THE FIRE PROTECTION SUBCOMMITTEE
ROOM T-2B3, 11545 ROCKVILLE PIKE, ROCKVILLE MD
APRIL 23, 2003

-~~PROPOSED~~ SCHEDULE-

Contact: Marvin Sykes (301-415-8716, mds1@nrc.gov)

	Topics	Presenters	Time
I	**Opening Remarks**	S. Rosen, ACRS	8:30- 8:35 a.m. 5 minutes
II	**Staff Introduction and Overview**	Suzie Black, NRR John Hannon, NRR	8:35 - 8:45 a.m. 10 minutes
III	**Circuit Analysis Issues Resolution** a. Regulatory Issue Summary (RIS) a. NUREG-1778 b. NRC Training c. Public Meeting d. Implementation Schedule e. SECY 04-XXX f. NEI Comments	S. Weerakkody, NRR Mark Salley, NRR Alex Marion, NEI	8:45 - 10:15 a.m. 1.5 hours
	BREAK		**10:15 - 10:~~30~~ 35 a.m. 15 minutes**
IV	**Revised Fire Protection Significance Determination Process** a. Background and Overview b. Methodology c. Application d. Implementation Schedule e. NEI Comments	Mark Reinhart, NRR S. Weerakkody, NRR Alex Marion, NEI	10:~~20~~ 35 - 12:~~00~~ 05 p.m. 1.5 hours
	LUNCH		**12:~~00~~ 05 - 1:~~00~~ 05 p.m. 1 hour**
V	**Fire Risk Requantification** a. Background and Overview b. Preliminary Results c. Completion Schedule	J. S. Hyslop, RES	1:00 - 2:30 p.m 1.5 hours
	BREAK		**2:30 - 2:45 p.m. 15 minutes**

VI	**Rulemaking Status Updates**		
	a. Manual Action	Richard Dudley, NRR Ray Gallucci, NRR	2:45 - 3:15 p.m. 30 minutes
	b. 10 CFR 50.48 **(NFPA 805)**	J. Birmingham, NRR P. Lain, NRR	3:15 - 3:45 30 minutes
VII	**General Discussion**	ACRS Members	3:45 - ~~4:00~~ 3:55 p.m. 15 minutes
VIII	**Adjourn**	S. Rosen, ACRS	~~4:00~~ 3:55 p.m.

NOTE:

- Presentation time should not exceed 50 percent of the total time allocated for specific item. The remaining 50 percent of the time is reserved for discussion.
- 35 copies of the presentation materials to be provided to the Subcommittee.

generated by neutron activation of air. In most cases, this will be kept as low as practicable by using gases other than air for supporting experiments. Experiments that are supported by air are designed to minimize production of argon–41. Yearly doses to persons in unrestricted areas will be at or below established 10 CFR part 20 limits. Routine releases of radioactive liquid effluents can be carefully monitored and controlled in a manner that will ensure compliance with the regulations. Solid radioactive wastes will be shipped in approved containers to an authorized disposal site or to a facility licensed to treat and consolidate radioactive waste. These wastes should not require more than a few shipping containers a year.

Based on experience with other research reactors, specifically TRIGA reactors operating in the 1 to 2 MWt range, the annual release of gaseous and liquid effluents to unrestricted areas should be less than 30 curies (1,110,000 MBq) and 0.01 curies (370 MBq), respectively.

No release of potentially harmful chemical substances will occur during normal operation. Small amounts of chemicals and/or high-solid content water may be released from the facility through the sanitary sewer during periodic blowdown of the cooling tower or from laboratory experiments. The quality of secondary cooling water may be maintained using biocides, corrosion inhibitors and pH control chemicals. The use of these chemicals for this purpose is approved by the Environmental Protection Agency (EPA). The small amounts of laboratory chemicals that may be used in research laboratories are disposed of in accordance with EPA and state requirements.

Other potential effects of the facility, such as aesthetics, noise, societal or impact on local flora and fauna are expected to be too small to measure.

Environmental Effects of Accidents

Accidents ranging from the failure of experiments up to the largest core damage and fission product release considered possible result in doses that are less than 10 CFR part 20 limits and are considered negligible with respect to the environment.

Unavoidable Effects of Facility Construction and Operation

The unavoidable effects of construction and operation involve the materials used in construction that cannot be recovered and the fissionable material used in the reactor. No adverse impact on the environment is expected from either of these unavoidable effects.

Alternatives to Construction and Operation of the Facility

To accomplish the objectives associated with research reactors, there are no suitable alternatives. Some of these objectives are training of students in the operation of reactors, production of radioisotopes, and use of neutron and gamma ray beams to conduct experiments.

Long-Term Effects of Facility Construction and Operation

The long-term effects of research facilities are considered to be beneficial as a result of the contribution to scientific knowledge and training. Because of the relatively small amount of capital resources involved and the small impact on the environment, very little irreversible and irretrievable commitment is associated with such facilities.

Costs and Benefits of Facility Alternatives

The costs are on the order of several millions of dollars with very little environmental impact. The benefits include, but are not limited to, some combination of the following: conduct of activation analyses, conduct of neutron radiography, training of operating personnel, and education of students. Some of these activities could be conducted using particle accelerators or radioactive sources which would be more costly and less efficient. There is no reasonable alternative to a nuclear research reactor for conducting this spectrum of activities.

Conclusion

The staff concludes that there will be no significant environmental impact associated with the licensing of research reactors or critical facilities designed to operate at power levels of 2 MWt or lower and that no environmental impact statements are required to be written for the issuance of construction permits, operating licenses or license renewals for such facilities.

Revised: March 30, 2004.

[FR Doc. 04–8046 Filed 4–8–04; 8:45 am]

BILLING CODE 7590–01–P

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Reactor Safeguards; Meeting of the Subcommittee on Reactor Fuels; Notice of Meeting

The ACRS Subcommittee on Reactor Fuels will hold a meeting on April 21, 2004, Room T–2B1, 11545 Rockville Pike, Rockville, Maryland.

Portions of the meeting may be closed to public attendance to discuss Duke Power or Framatome proprietary information per 5 U.S.C. 552b(c)(4).

The agenda for the subject meeting shall be as follows: Wednesday, April 21, 2004—8:30 a.m. until the conclusion of business.

The purpose of this meeting is to review proposed license amendment to authorize the use of mixed oxide (MOX) Lead Test Assemblies at the Catawba Nuclear Station. The Subcommittee will hear presentations by and hold discussions with representatives of the NRC staff, Duke Power, Framatome, and other interested persons regarding these matters. The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Members of the public desiring to provide oral statements and/or written comments should notify the Designated Federal Official, Mr. Ralph Caruso (telephone 301–415–8065) five days prior to the meeting, if possible, so that appropriate arrangements can be made. Electronic recordings will be permitted only during those portions of the meeting that are open to the public.

Further information regarding this meeting can be obtained by contacting the Designated Federal Official between 8 a.m. and 5:30 p.m. (ET). Persons planning to attend this meeting are urged to contact the above named individual at least two working days prior to the meeting to be advised of any potential changes to the agenda.

Dated: April 2, 2004.

Michael R. Snodderly,

Acting Associate Director for Technical Support, ACRS/ACNW.

[FR Doc. 04–8044 Filed 4–8–04; 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 April 23, 2004, Room T–2B3, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance.

The agenda for the subject meeting shall be as follows: *Friday, April 23, 2004—8:30 a.m. until the conclusion of business.*

The purpose of this meeting is to discuss the resolution of post-fire safe shutdown circuit analysis issues, revisions to the Reactor Oversight Process (ROP) Fire SDP, and the preliminary results of the staff's Fire Risk Requantification Study. The Subcommittee will hear presentations by and hold discussions with the NRC staff, representatives of the Nuclear Energy Institute, and other interested persons regarding this matter. The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Members of the public desiring to provide oral statements and/or written comments should notify the Designated Federal Official, Mr. Marvin D. Sykes (Telephone: 301–415–8716) five days prior to the meeting, if possible, so that appropriate arrangements can be made. Electronic recordings will be permitted.

Further information regarding this meeting can be obtained by contacting the Designated Federal Official or the Cognizant Staff Engineer between 7:30 a.m. and 4:15 p.m. (ET). Persons planning to attend this meeting are urged to contact one of the above named individuals at least two working days prior to the meeting to be advised of any potential changes to the agenda.

Dated: April 2, 2004.

Michael R. Snodderly,

Acting Associate Director for Technical Support, ACRS/ACNW.

[FR Doc. 04–8045 Filed 4–8–04; 8:45 am]

BILLING CODE 7590–01–P

SECURITIES AND EXCHANGE COMMISSION

[Release No. 34–49528; File No. PCAOB–2003–10]

Public Company Accounting Oversight Board; Notice of Filing of Proposed Auditing Standard No. 1, References in Auditors' Reports to the Standards of the Public Company Accounting Oversight Board

April 6, 2004.

Pursuant to Section 107(b) of the Sarbanes-Oxley Act of 2002 (the "Act"), notice is hereby given that on December 22, 2003, the Public Company Accounting Oversight Board (the "Board" or the "PCAOB") filed with the Securities and Exchange Commission (the "Commission" or the "SEC") the proposed rule described in Items I and II below, which items have been prepared by the Board.[1] The Commission is publishing this notice to solicit comments on the proposed rule from interested persons.

I. Board's Statement of the Terms of Substance of the Proposed Rule

On December 17, 2003, the Board adopted a rule, Auditing Standard No. 1, References in Auditors' Reports to the Standards of the Public Company Accounting Oversight Board ("the proposed rule"). The text of the proposed rule is set out below.

The text of the proposed rule, including an appendix of illustrative auditor's reports, is as follows:

Auditing Standard No. 1—References in Auditors' Reports to the Standards of the Public Company Accounting Oversight Board

1. The Sarbanes-Oxley Act of 2002 authorized the Public Company Accounting Oversight Board ("PCAOB") to establish auditing and related professional practice standards to be used by registered public accounting firms. PCAOB Rule 3100, *Compliance with Auditing and Related Professional Practice Standards*, requires the auditor to comply with all applicable auditing and related professional practice standards of the PCAOB.

2. The Board has adopted as interim standards, on an initial, transitional basis, the generally accepted auditing standards, described in the American Institute of Certified Public Accountants' ("AICPA") Auditing Standards Board's Statement on Auditing Standards No. 95, *Generally Accepted Auditing Standards*, in existence on April 16, 2003.[2]

3. Accordingly, in connection with any engagement performed in accordance with the auditing and related professional practice standards of the PCAOB, whenever the auditor is required by the interim standards to make reference in a report to generally accepted auditing standards, U.S. generally accepted auditing standards, auditing standards generally accepted in the United States of America, or standards established by the AICPA, the auditor must instead refer to "the standards of the Public Company Accounting Oversight Board (United States)." An auditor must also include the city and state (or city and country, in the case of non-U.S. auditors) from which the auditor's report has been issued.

4. This auditing standard is effective for auditors' reports issued or reissued on or after the 10th day following approval of this auditing standard by the Securities and Exchange Commission.

5. Audit reports issued prior to the effective date of this standard were required to state that the audits that supported those reports were performed in accordance with generally accepted auditing standards. The PCAOB adopted those generally accepted auditing standards, including their respective effective dates, as they existed on April 16, 2003, as interim standards. Therefore, reference to "the standards of the Public Company Accounting Oversight Board (United States)" with respect to audits of financial statements performed prior to the effective date of this standard is equivalent to the previously-required reference to generally accepted auditing standards. Accordingly, upon adoption of this standard, a reference to generally accepted auditing standards in auditors' reports is no longer appropriate or necessary.

Note: The term "auditor" in this standard is intended to include both registered public accounting firms and associated persons thereof.

APPENDIX

Illustrative Reports

The following is an illustrative report on an audit of financial statements:

Report of Independent Registered Public Accounting Firm

We have audited the accompanying balance sheets of X Company as of December 31, 20X3 and 20X2, and the related statements of operations, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 20X3. These

[1] Section 3(c) of the Act provides that "[n]othing in this Act or the rules of the Board shall be construed to impair or limit * * * (2) the authority of the Commission to set standards for accounting or auditing practices or auditor independence, derived from other provisions of the securities laws or the rules or regulations thereunder, for purposes of the preparation and issuance of any audit report, or otherwise under applicable law * * *." When an independent accountant prepares a report for submission or filing with the Commission, the independent accountant would be considered to be representing that it has complied with the applicable federal securities laws and Commission rules and staff guidance, as well as with the standards of the Public Company Accounting Standards Board (United States) as referenced explicitly in the Board's proposed Auditing Standard No. 1. In a note to PCAOB Rule 3600T, Interim Independence Standards, the Board specifically provided that the PCAOB's rules do not supersede the Commission's rules, and, therefore, registered public accounting firms must comply with the more restrictive of the Commission's or the Board's rules.

[2] The Board's rules on interim standards were adopted by the Board on April 16, 2003, and approved by the Commission on April 25, 2003. *See* Release No. 33–8222 (April 25, 2003).

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON FIRE PROTECTION

April 23, 2004
Date

PLEASE PRINT

ATTENDEES PLEASE SIGN-IN FOR THE MEETING

NAME	AFFILIATION
Nancy Chapman	SERCH / Bechtel
STEVE NOWLEN	SANDIA LAB'S
PAUL GUNTER	NIRS
Jeff Erfman	Progress Energy
Scott Amey	POGO
BIJAN NAJAFI	SAIC (EPRI)
Alex Marion	NEI

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

SUBCOMMITTEE MEETING ON FIRE PROTECTION

April 23, 2004
Date

NRC STAFF SIGN IN FOR ACRS MEETING

PLEASE PRINT

NAME	NRC ORGANIZATION
Sunil Weerakkody	NRR/DSSA/SPLB
JIANG HONG	NRR / DE / EEIB
JASON DREISBACH	NRR/DIPM/IIPB
DARIUSZ SZWARC	NRR/DSSA/SPLB
Mark Reinhart	NRR/DSSA/SPSB
Robert Radlinski	NRR/DSSA/SPLB
SUZANNE BLACK	NRR/DSSA
RICHARD DIPERT	NRR/DSSA/SPLB
Ray Gallucci	NRR/DSSA/SPLB
Mark Henry Salley	NRR/DSSA/SPLB
Daniel M Frumkin	NRR/DSSA/SPLB
Eileen McKenna	NRR/DRIP/RPRP
Doug Coe	NRR/DIPM/IIPB
Richard Dudley	NRR/DRIP/RPRP

Fire Protection Open Issues Path and Schedule for Closure

Suzanne Black, Director Division of Systems Safety and Analysis

April 12, 2004

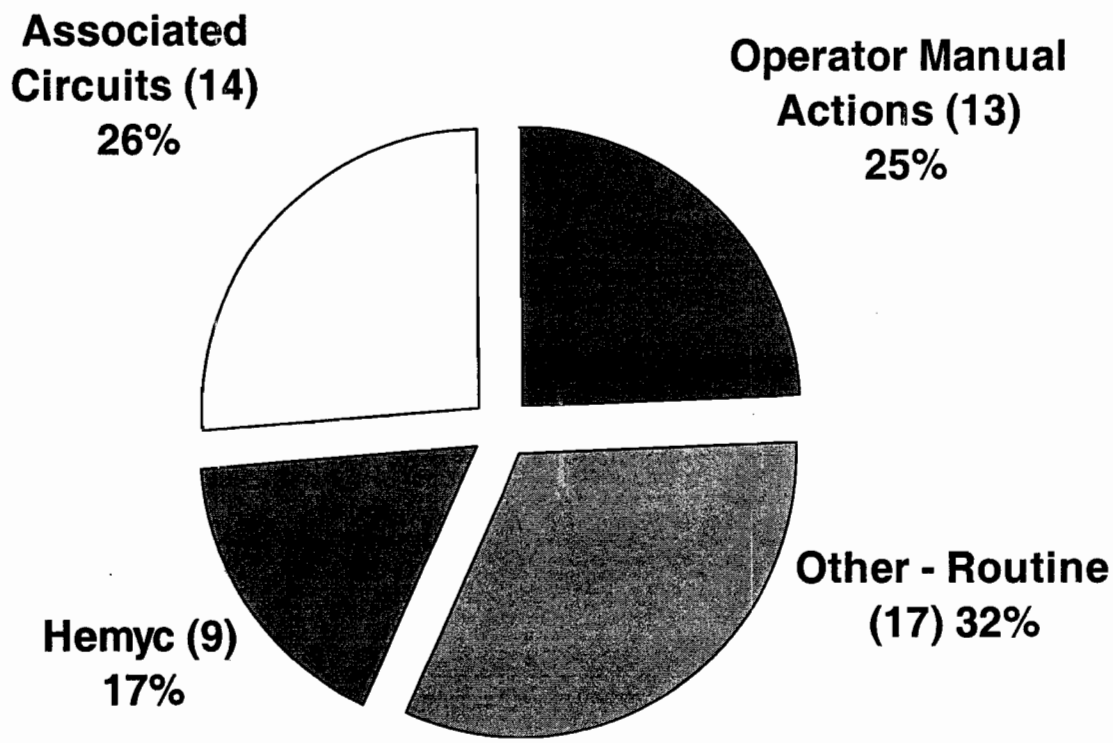
Objectives

- Discuss progress to date
- Describe staff actions to address known challenges and return fire protection to routine
- Present the schedule for closure

Progress To-Date

- Risk-informed fire protection inspection tools developed
- Rulemaking plan approved for operator manual actions
- Post-fire safe-shutdown associated circuit analysis regulatory issue summary (RIS)
- Issue Management Process established for new issues

Fire Protection Inspections Unresolved Issues (URIs)



Path-to-Closure – General Approach

- Clarify expectations through rulemaking and generic communications
- Ensure expectations are understood by all stakeholders (e.g., inspector training and workshops)
- Ensure that oversight infrastructure is in place – including means to address current backlog of findings

Operator Manual Actions Path-to-Closure (25% of URIs)

- Inspection procedure upgraded in 2002 to include feasibility criteria
- Issue final interim criteria for enforcement discretion to EDO (August 2004)
- Submit proposed rule to Commission (December 2004)
- Publish final Rule (December 2005)

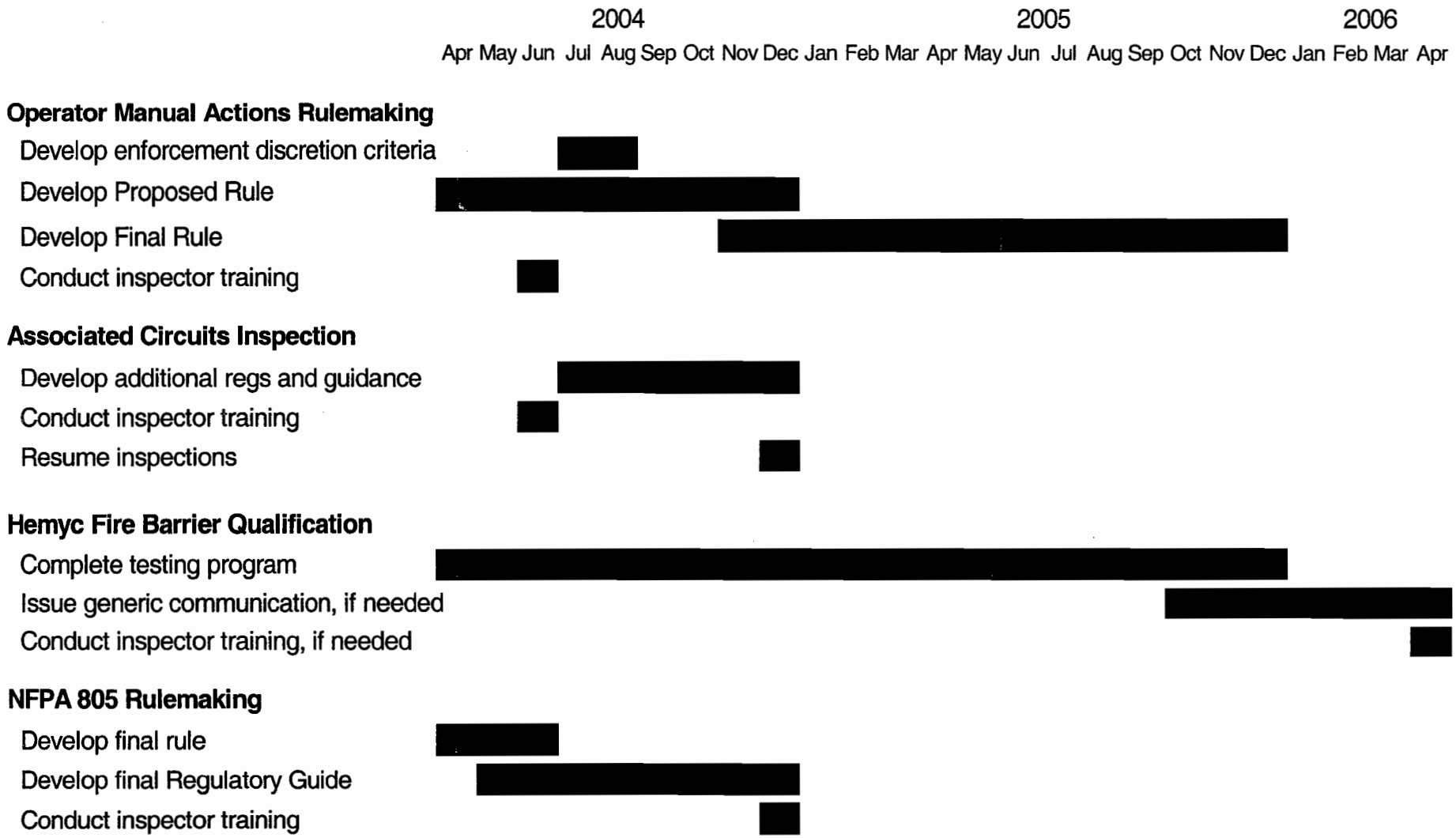
Associated Circuits Inspection Path-to-Closure (26% of URIs)

- Issued Regulatory Issue Summary (March 2004)
- Issue revised inspection procedures and conduct inspector training (June 2004)
- Issue generic communication defining expectations for meeting requirements (December 2004)
- Resume inspections

Hemyc – Path-to-Closure (17% of URIs)

- Testing is underway
- Complete testing program (December 2005)
- Issue generic communication with guidance for implementation, if required (April 2006)
- Conduct inspector training, if needed (April 2006)

Schedule of Activities
Closure of Fire Protection Issues



Summary

- Have identified the major fire protection issues
- We are implementing actions to resolve them
- NFPA 805 provides an alternate path

STATUS OF FIRE PROTECTION ACTIVITIES

Presentation to the ACRS Subcommittee on Fire Protection
April 23, 2004

Suzanne Black
Director, Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

Key Activities\Staff Introduction

- Risk Informing Associated Circuits (Mark Salley)
- Fire Protection SDP (Mark Reinhart and Dan Frumkin)
- Fire Risk-Requantification Study (J.S. Hyslop)
- NFPA 805 Rule (Robert Radlinski)
- Manual Action Rule Making (Ray Gallucci)

Commission's Expectations

- Path to closure
- Schedule for closure

(Handout: Copy of the presentation to the Chairman and Commissioner Merrifield)

STATUS OF FIRE PROTECTION ACTIVITIES

Presentation to the ACRS Subcommittee on Fire Protection

April 23, 2004

Sunil Weerakkody

Chief, Fire Protection and Special Projects Section

Office of Nuclear Reactor Regulation

OBJECTIVE

Periodic Update to the ACRS Subcommittee about the status of Fire Protection Activities

Overview

- Risk Informing Associated Circuits – Issued final RIS and preparing for implementation
- Fire Protection SDP – Revised FP SDP and preparing for implementation
- NFPA 805 Rule – Final rule with the Commission and preparing for implementation
- Manual Action Rule making – Issued Interim Draft Acceptance Criteria
- Research – Completed several key research activities and continuing several others

RISK-INFORMING POST-FIRE SAFE-SHUTDOWN ASSOCIATED CIRCUIT INSPECTIONS

Mark Henry Salley P.E
Fire Protection Engineer
Plant Systems Branch
Division of Systems Safety and Analysis
Office of Nuclear Reactor Regulation

Presentation at ACRS Fire Protection Subcommittee
Rockville, MD.
April 23, 2004

United States Nuclear Regulatory Commission
Washington, DC 20555-0001

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REVIEW

- 10 CFR Part 50, Appendix R/NUREG 0800 SRP.
  - Licensees are required to provide reasonable assurance that **Fire-Induced Circuit Failures** that could adversely affect the ability to achieve and maintain post-fire safe shutdown will not occur
- Information Notice 99-17, Problem Associated with Post-Fire Safe Shutdown Circuit Analyses.
  - Recent problems with associated circuits at a number of licensees
- November 2000, NRC suspends associated circuit inspection.
  - Determines the issue is generic
  - Work with stakeholders to solve the issue in a **Risk-Informed** manner

REVIEW/STATUS

- NEI Fire Testing.
  - 18 full-scale fire tests
  - May 2002, EPRI published, "Spurious Actuation of Electrical Cables to Cables Fire: Results of Expert Elicitation."
- February 2003, Facilitated Public Workshop.
  Consensus on the Most Risk Significant Associated Circuit Scenarios
  - Identify Most Risk Significant Cable Configurations and Attributes
- August 2003, Draft Regulatory Issue Summary (RIS).
  - Technical input for Risk-Informing Associated Circuit Inspections
  - Issued for public comment
- September 2003, ACRS Fire Protection Subcommittee
  - Discussed NRR proposed plans for Risk-Informing Associated Circuit Inspections and restarting inspections.
- January 2004, Draft NUREG-1778
  - Knowledge Base Post-Fire Safe-Shutdown Analysis
  - Issued for public comments
- March 2004, Issued RIS 2004-03
  - Framework for Risk-Informing Associated Circuit Inspections
- April 2004, ACRS Fire Protection Subcommittee
  - Discussed NRR final plans for restarting inspections.

ASSOCIATED CIRCUIT RISK

- Risk = (Fire Frequency) x (Likelihood of fire effects & cable attributes that contribute to failure) x (Likelihood of undesired consequences).
  - Fire Frequency established in other programs
  - Credible Fire Threat
    - Fire Dynamics Analysis
  - Cable Attributes
    - Thermal Failure Mechanism
  - Severity of Consequence

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CABLE ATTRIBUTES – RELATIONSHIP TO RISK

- Fire Testing
  - Review Past Research Work
    - (Sandia National Laboratory, Factory Mutual, etc.)

  NEI 00-01 Fire Testing Program
  - Determined Spurious Operations were Credible due to Associated Circuits
  - Provided Insights on Probability of Spurious Operations

- Results (High Risk ~ RES Confirmed)
  - Thermoplastic vs. Thermoset Jacket/Insulation Materials
    - Thermoplastic ~ 400 F Thermoset ~ 625 F
  - Intra- vs. Inter- Cable Failure
    - Intra-Cable Shorting more likely than Inter-cable shorting
    - Inter-cable Shorting only considered for Thermoplastic to Thermoplastic at this time

SEVERITY OF CONSEQUENCE OF THE SPURIOUS OPERATION

- Most Risk Significant Consequences
  - Failures that Impede Hot Shutdown within the First Hour of the Event
    - Flow Diversion
    - Loss of Coolant
    - Other Scenarios
  - Typical Post-Fire Safe-Shutdown Analysis
    - Estimated 5 man-years effort for 1 Unit ~ 10,000 man-hours
    - Triennial Fire Protection Inspection 3 weeks ~ 100 man-hours/inspector

NUMBER OF CABLE FAILURE TO CONSIDER

- Two "cable" Failures Evaluated per Scenario.
  - Intra – cables failure for all cable types Thermoset or Thermoplastic
  - Any number of conductors/combinations are possible within the cable
  - Inter – cable failures possible between Thermoplastic cables
- Capture Majority of Safety Significant Configurations
  - Evaluating 2 cables per scenario will capture vast majority of Risk
  - Sufficient Conservatism to Re-start Inspections
  - RES will be evaluating if more than 2 cables per scenario should be considered

ISSUES REQUIREING FURTHER RESEARCH – REFINING RISK

- Expected Lower Risk – Requires Additional Research to Better Understand & Further Reduce Uncertainties
  - Inter – cable shorting of Thermoset cables
    - Thermoset to Thermoplastic
    - Thermoset to Thermoset
  - Need to Evaluate Three or More Cables for Each Scenario
    - How many are creditable?
  - Effects of Control Power Transformers (CPT)
  - Duration of Hot Shorts
    - How long do they remain energized?

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LOW RISK CIRCUIT ATTRIBUTES/CONFIGURATIONS

- Low Risk (RES Confirmed)
  - Open Circuits
    - Loss of Continuity
  - Inter – cable Shorting involving Cables outside Conduits and Armored Cable with those Cables inside
  - Multiple High – Impedance Faults on a Common Power Supply
  - Three-Phase Power Failures Occurring with Proper Polarity
  - Reversible DC–Motor Power Cable
    - Requires Proper Combination & Polarity of 5 Circuit Failures

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REMAINING ACTIVITY

- Observe NEI 04-06 Self-Assessment Program
  - Davis Besse May 2004
- Complete & Issue SECY Paper to Commission Summer 2004
  - Rule making question?
- Conduct NRC Inspector Workshop June/July 2004
  - Revising Inspection procedures
  - Addressing previous URIs
- Conduct Public Workshop September/October 2004
- Issue NUREG 1778 Fall/Winter 2004

  Restart Associated Circuit Inspections January 1, 2005
- Reduce Uncertainties ~ Issues Requiring Further Research (FY 05/06)

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CONCLUSION

- RIS 2004-03 has been Issued
  - NRR course is set to restart Inspections
- Inspections will Focus on **Most Risk Significant Associated Circuit Configurations**
- Most Effective Use of Inspection and Licensee Resources.
- Promote Safety Culture/Questioning Attitude in this Risk-Sensitive Area.
- Research Activities for Further Refinement of Uncertainties

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FIRE PROTECTION SDP
Status
For The
Advisory Committee on Reactor Safeguards

Mark Reinhart, Chief

Operations Support & Licensing Section

Probabilistic Safety Assessment Branch

U.S. Nuclear Regulatory Commission

Revised Fire Protection Significance Determination Process (SDP)

- Used Team of Primary Developers:
  - NRC
    - NRR
    - RES
    - Regions
  - Sandia National Laboratories (SNL)
  - EPRI
  - Licensees
  - NEI
- Used more State of the Practice risk tools

Contents

- Introduction
- Approach
- Assumptions and Limitations
- Phase 1 – Qualitative Screening
- Phase 2 – Quantitative Approach
- Attachments 1 through 9
- Supporting Guidance Document

Schedule

- Public Meeting: Issue Revised Draft SDP — Oct. 2003 (Complete)
- Prepare Tabletop Exercises — Nov. 2003 (Complete)
- Conduct Tabletop Exercises & Benchmarking — Nov. 2003 to Mar. 2004 (Complete)
- Issue SDP to IIPB — Feb. 2004 (Complete)
  - Resolve Feedback
- Train FP Inspectors & Regional SRAs — May 2004
- Implement SDP — May 31, 2004

FIRE PROTECTION SDP

Steps For The Advisory Committee on Reactor Safeguards

Daniel Frumkin

Fire Protection Engineering and Special Projects Section

Plant Systems Branch

U.S. Nuclear Regulatory Commission

Fundamental Method

$$CDF = DF * \sum_{i=1}^{n} f_i * SF_i * PNS_i * CCDP_i$$

CDF – Core Damage Frequency

DF – Duration Factor

F – Fire Frequency

SF – Severity Factor

PNS – Probability of Non-Suppression

CCDP – Conditional Core Damage Frequency

Phase 1: Initial Screening

- Calculations and results recorded in Attachment 1 worksheet [Step 1.1]
- Low degradation findings screen to green [Step 1.3]
- Cold shutdown findings screen to green [Step 1.3]
- Multi-room term screens to green under for some scenarios [Step 1.3]
- Generic fire area frequencies are provided in SDP [Step 1.4]

Generic Fire Area Frequencies

Generic Fire Area Fire Frequencies	
Room Identifier	**Generic Fire Frequency**
Auxiliary Building (PWR)	4E-2
Battery Room	4E-3
Cable Spreading Room - Cables Only	2E-3
Cable Spreading Room - Cables Plus Other Electrical Equipment	6E-3
Cable Vault or Tunnel Area - Cables Only	2E-3
Cable Vault or Tunnel Area - Cables Plus Other Electrical Equipment	6E-3
Containment - PWR or non-inerted BWR	1E-2
EDG Building	3E-2
Intake Structure	2E-2
Main Control Room	8E-3
Radwaste Area	1E-2
Reactor Building (BWR)	9E-2
Switchgear Room	2E-2
Transformer Yard	2E-2
Turbine Building - Main Deck (per unit)	8E-2

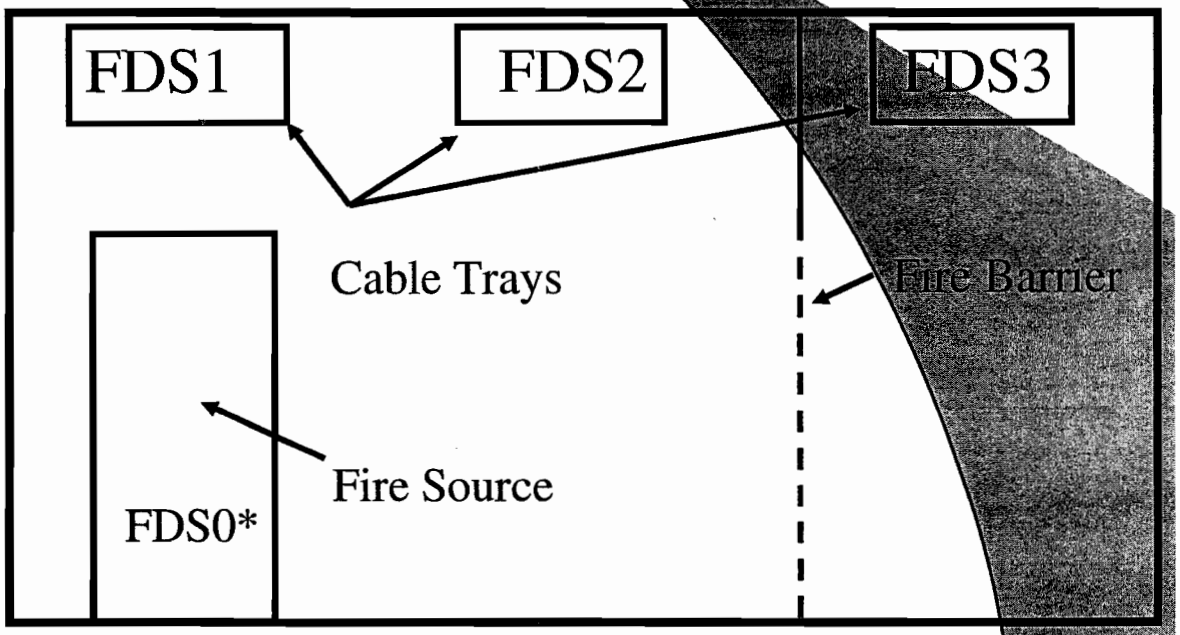
Example of Quantitative Screen

- **Quantitative screening criteria [Step 1.4]**

Phase 1 Quantitative Screening Criteria		
Assigned Finding Category (from Step 1.1):	**$\Delta CDF_{1.4}$ Screening Criteria**	
	Moderate Degradation	**High Degradation**
Fire Prevention and Administrative Controls	1E-4	1E-6
Fixed Fire Protection Systems	1E-5	
Fire Confinement	1E-5	
Localized Cable or Component Protection	1E-5	
Post-fire SSD	1E-6	

Phase 2, Step 2.1 – Independent Safe Shutdown Path Screening Assessment, and Step 2.2 – Fire Damage State Determination

- Screen for findings with independent shutdown path [Task 2.1.1]
- FDS is Fire Damage State, FDS1, FDS2, and FDS3 – See Figure [Task 2.2.1]
- Ability to screen unlikely fire confinement findings [Task 2.2.2]



* FDS0 assumes only equipment of fire origin is damaged.

Step 2.3 – Fire Scenario Identification, and Step 2.4 – Fire Frequency for Unscreened Sources

- Component based fire frequency [Task 2.3.1]
- Treatment of non-simple fires [Task 2.3.2]
- Zone of influence chart and fire growth and damage correlations [Task 2.3.4]
- Screening of fire sources [Task 2.3.4]
- Includes tool to increase fire frequency for poor combustible control programs and poor hot work controls [Task 2.4.2]
- Compensatory measures may be credited to reduce the impact of transient or hot work fires [Task 2.4.3]

Step 2.5 – Independent SSD Path Second Screening, and Step 2.6 – Analyze Fire Growth and Damage Time

- Specific growth and damage scenarios are identified [Task 2.5.1]
- If equipment or related cables could be damaged at this point, the SDP assumes the train is unavailable [Task 2.5.2]
- Result is a time in minutes (for all scenarios), this will help to avoid screening fast fires [Task 2.6.1]
- Fire dynamics tools are used as needed [Task 2.6.1]

Step 2.7 – Fire Non-Suppression Probability Analysis

- Credit for fire watch and for detection by general plant personnel [Task 2.7.1]
- Use of fire dynamics tools to estimate detection and fixed suppression time [Task 2.7.1]
- Both effectiveness and timing are considered for fixed suppression systems [Task 2.7.2]
- Probability of non-suppression for manual fire suppression [Task 2.7.3]
- Fixed suppression and manual suppression are combined for each scenario [Task 2.7.4]

Table of Non-Suppression Values for Manual Fire Fighting Based on Fire Duration

Table of Non-suppression Probability Values for Manual Fire Fighting Based on Fire Duration (Time to Damage after Detection) and Fire Type Category

$T_{Damage} - T_{Detection}$ (min)	Mean manual non-suppression probability curve values - PNS_{manual}									
	All Events	Hot Work - Welding	Transients	Electrical Fires	Cable Fires	Switchyard	Main Control Room	Turbine Generator	Energetic Arcing Faults	Containment
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	0.93	0.93	0.87	0.88	0.78	0.97	0.77	0.98	0.94	0.93
2	0.86	0.86	0.75	0.77	0.61	0.95	0.60	0.95	0.89	0.86
3	0.80	0.80	0.66	0.68	0.47	0.92	0.46	0.93	0.84	0.80
4	0.74	0.74	0.57	0.60	0.37	0.90	0.36	0.91	0.79	0.74
5	0.69	0.68	0.49	0.52	0.29	0.87	0.28	0.89	0.75	0.69
6	0.64	0.63	0.43	0.46	0.22	0.85	0.21	0.87	0.71	0.64
7	0.59	0.59	0.37	0.40	0.17	0.83	0.16	0.85	0.67	0.59
8	0.55	0.54	0.32	0.36	0.14	0.81	0.13	0.83	0.63	0.55
9	0.51	0.50	0.28	0.31	0.11	0.79	0.10	0.81	0.59	0.51
10	0.47	0.47	0.24	0.27	0.08	0.77	0.08	0.79	0.56	0.47
12	0.41	0.40	0.18	0.21	0.05	0.73	0.05	0.76	0.50	0.41
14	0.35	0.34	0.14	0.16	0.03	0.69	0.03	0.72	0.45	0.35
16	0.30	0.30	0.11	0.13	0.02	0.65	0.02	0.69	0.40	0.30
18	0.26	0.25	0.08	0.10	0.011	0.62	0.01	0.66	0.35	0.26
20	0.22	0.22	0.06	0.08	0.007	0.59	0.006	0.63	0.32	0.23
25	0.15	0.15	0.03	0.04	0.002	0.51	0.002	0.56	0.24	0.16
30	0.11	0.10	0.015	0.02	0.001	0.45	*	0.50	0.18	0.11
35	0.07	0.07	0.007	0.011	*	0.39	*	0.44	0.13	0.07
40	0.05	0.05	0.004	0.006	*	0.34	*	0.39	0.10	0.05
45	0.03	0.03	0.002	0.003	*	0.30	*	0.35	0.07	0.03
50	0.02	0.02	0.001	0.002	*	0.26	*	0.31	0.06	0.02
55	0.02	0.02	*	0.001	*	0.23	*	0.28	0.04	0.02
60	0.01	0.01	*	*	*	0.20	*	0.25	0.03	0.01

Step 2.8 – Plant Safe Shutdown Response Analysis, and Step 2.9 – Final Quantification

- Plant specific inspection notebooks are used to help determine CCDP [Task 2.8.1]
- Manual action worksheets have been developed for fire response [Task 2.8.2]
- Spurious actuations are considered based on cable type and configuration [Task 2.8.5]

Partial Manual Action Worksheet

Manual Actions Evaluation Table for Actions at a Remote Location			
Category	**Task and Scenario Characteristics**	**Performance Shaping Factors**	**Comments**
Direct Physical Effect of Fire (Ergonomics)	Location and fire area well separated		
		Operator must pass through areas affected by fire environment to reach location	
	No barrier or potentially significant leakage between location and fire area	Dense smoke, high temperature, and/or CO_2 impact in location	No credit for SCBAs
Functional Considerations (Ergonomics)	Accessibility restricted, e.g., a ladder, or special tool required	Tools properly staged	
		Tools must be brought in	
	Lighting failed	Emergency lighting or flashlights available	
		Neither emergency lighting nor flashlights available	
Procedures	Procedures specific to this activity	Procedures posted at the location, and all required actions addressed and achievable at location	
		Must be obtained from control room	Adjust to β if time is limited
	No specific procedure or procedure unclear		
Training/Experience	Realistic training on scenario		

Conclusion

- Revised Fire Protection Phase 2 SDP
  - Resolves Some Previous Challenges
- Significant Staff & Industry Consensus
  - Fundamental Approach
    - Logical
    - More Consistent Results
  - References & Data Bases
- Phase 3 Analyses Will Need Contractor (SNL)
- Licensing Bases Issues Independent of SDP
  - Staff & Industry Still Need to Work to Understand

Rulemaking Status Update
10 CFR 50.48 – NFPA 805

Bob Radlinski, Fire Protection Engineer - DSSA/SPLB

April 23, 2004

Program Components

- Amendment to 10 CFR 50.48
- NEI implementation guide
- New regulatory guide
- Inspection guidance and training
- Other methods and tools
  - License amendment review guidance
  - Fire risk re-quantification study
  - Validation and verification of fire models

NEI Implementation Guide

- NEI 04-02, "Guidance for Implementing A Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)"
- Revision E is currently being reviewed
- Public meeting to discuss comments on April 30
- Best-case scenario - final issue by NEI expected by end of May
- Per ACRS comment, guidance should not create unnecessary barriers to use of NFPA 805

Regulatory Guide

- Plan is that Regulatory Guide will simply endorse NEI guide
- Dependent on acceptability of NEI guide – still in review
- If agreement on guide can be achieved in the near term, first draft of reg guide can be out in June

Inspection Guidance

- Inspection procedures will be revised to address plants adopting NFPA 805
- Workshops will be conducted for inspector training
- Inspection guidance document will be prepared for inspectors

Inspection Resources

- Not expected to have significant impact
- No plans to change approach to inspection
- Burden on licensee – self assessment
- Licensee required to perform plant-wide evaluation before changing program
- Initial submittals will get comprehensive review by staff
- Enforcement discretion during transition
- Future changes will be monitored

Other Methods and Tools

- Fire risk re-quantification study - addressed previously
- Acceptable fire models will be identified following verification and validation
- License amendment review guidance will be prepared for staff's guidance

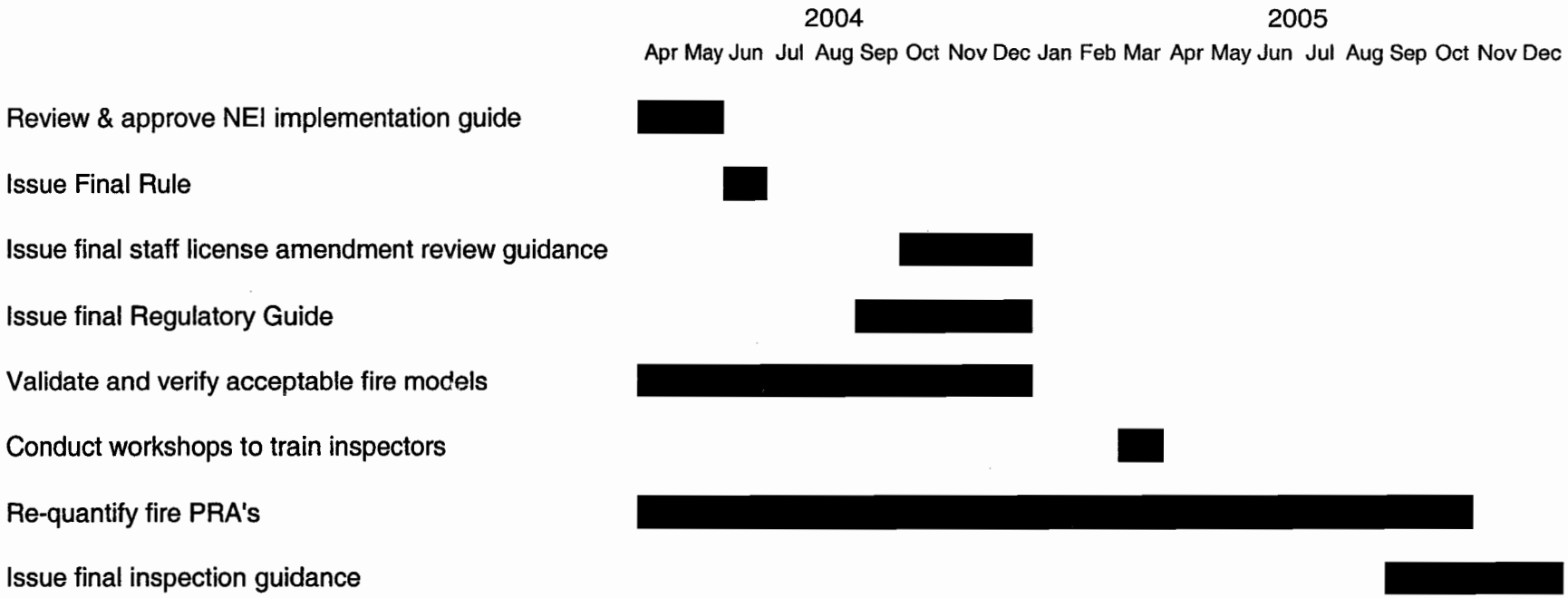
Completed Activities

- ACRS Full Committee briefing in December 2003
- ACRS endorsed Final Rule in December 2003
- Staff provided comments on NEI implementation guide in January 2004
- Submitted SECY for Final Rule to Commission in March 2004
- Submitted enforcement policy to Commission in March 2004 (with Final Rule)

Activities To-Go

- Complete NRC review and approval of NEI implementation guide
- Issue Final Rule
- Issue staff license amendment review guidance
- Issue final Regulatory Guide
- Validate and verify acceptable fire models
- Conduct workshops to train inspectors
- Re-quantify fire PRA's
- Issue final inspection guidance

Schedule of Activities
10 CFR 50.48 Rulemaking



United States
Nuclear Regulatory Commission

IMPROVED TECHNICAL APPROACH IN THE U.S.NRC/EPRI FIRE RISK REQUANTIFICATION STUDY

Presented by
J.S. Hyslop, Fire Research Team Leader
Probabilistic Risk Analysis Branch
Office of Nuclear Regulatory Research

Presented at
ACRS Subcommittee on Fire Protection
23rd April 2004

BACKGROUND

- MOU between NRC-RES and EPRI
- Fire risk addendum
- One of several elements on fire risk addendum

- ACRS Subcommittee on Fire Protection briefed on September 11, 2002
- Purpose: update Subcommittee

OBJECTIVES

- Develop and demonstrate state of art fire risk analysis methods
  - Consolidate existing research
  - Limited extension of state-of-art
  - Field test
- Identify strengths and weaknesses
- Update fire risk estimates
- Develop risk insights
- Transfer the technology

PARTICIPANTS

- EPRI
- U.S. NRC
- Two volunteer pilot plants (PWR)
  - D.C. Cook, Millstone Unit 3
- Six non-pilot plant participants
- Further cooperation
  - One independent pilot plant– Diablo Canyon
- Pilot plant recently added (BWR) – Nine Mile Point

EXPECTED USE OF PRODUCTS

- Guidance for risk-informed analyses (EPRI)
- Basis for review guidance that RES will develop for NFPA 805 related changes
- ANS fire risk standard

FRA AREAS ADDRESSED

- Fire data and ignition frequency
- Fire modeling
- Fire protection systems and features
  - Reliability and effectiveness
- Plant response
  - Systems analysis
  - Circuit analysis
  - Human reliability analysis

DEMONSTRATION STUDIES

- Analyses performed jointly by NRC and EPRI using case examples from pilot plant FRA.
- Purpose:
  - Demonstrate that methods can be implemented successfully in FRA
  - Technology transfer
- All 18 procedures demonstrated
- Demonstration studies in place of full update of plant FRA for initial pilots

ADVANCES

- Fire frequency
  - Prior condition: All fires considered
  - Now limited to potentially challenging
    - ✓Criteria developed
    - ✓Judgment still important
  - Other improvements
    - ✓Increased implementation of component based fire frequencies
    - ✓Two-stage Bayesian analysis

ADVANCES (cont.)

- Distributions of peak heat release rate (HRR)
  - Prior condition: Each source had single HRR and severity factor
  - Distributions developed based upon available data and experience
    - ✓ For each major fire ignition source type
    - ✓ Includes low frequency/high confidence values
    - ✓ Severity factor tied explicitly to intensity
  - Treatment of fire frequency/severity factor avoids double count with suppression

ADVANCES (cont.)

- Detection/manual suppression
  - A common approach: consideration of only fire brigade response time
  - New event tree approach characterizes potential paths to detection/suppression
  - Historical data approach
    - ✓ New approach ensures explicit treatment of long duration fires
    - ✓ Events carefully screened for inclusion
  - Duration curves binned by component or location

ADVANCES (cont.)

- Plant safe shutdown response model
  - Resolve difference between EOPs and plant safe shutdown procedures
  - Process for crediting equipment beyond Appendix R
  - Incorporate spurious operations and fire-specific operator actions
- Human reliability analysis
  - Three levels of degradation
  - Fire specific factors included
  - Quantitative screening guidance

ADVANCES (cont.)

- Circuit analysis
  - Prior condition: Limited examination of spurious operations
  - New approach: Method to identify fire unique failure modes and incorporate in plant model
  - Improvements due to RES and industry tests/studies
  - Cable and circuit selection criteria developed
  - Approaches in quantitative screening developed based upon cable/circuit conditions
  - Detailed quantification extended to specific cable mode and circuit fault

LESSONS AND INSIGHTS

- Past methods issues have been resolved through technical discussions - consensus reached by technical leads
- Demonstration studies have led to significant improvements
- Documenting procedures has taken more resources than originally estimated
  - Procedures are highly complex and comprehensive
  - Main goal was to consolidate the state of the art, but we have "pushed" the state of the art in several areas
- Procedures allow flexibility for user to determine extent that state of art is necessary
- Implementing circuit analysis methods may take extensive resources
- Technical insights still under development

STATUS

- Technical task procedures drafted
- Peer review ongoing
- Pilot application & testing of methodology
  - Limited testing of all procedures by EPRI/NRC at PWR
  - On-going use of methodology at another PWR
  - Full testing by EPRI/NRC at BWR planned in CY04-05
- Milestones

• Draft report	June 04
• Publication	Dec 04
• Joint EPRI/NRC Fire PRA Workshop (tentative)	1st qtr CY05
• Revision of publication based on BWR pilot (tentative)	Dec 05

FINAL REMARKS

- More comprehensive and accurate methods, tools, and data developed
- Path forward
  - Technology transfer
  - Development of ANS fire risk standard
- Feasibility study for low power and shutdown FRA guidance nearing completion

ACCEPTANCE CRITERIA FOR OPERATOR MANUAL ACTIONS RULEMAKING

Raymond HV Gallucci, PhD, PE
Senior Fire PSA Engineer, NRR/DSSA/SPLB

Presentation to the ACRS Fire Protection (FP) Subcommittee
April 23, 2004

BRIEF HISTORY

- 10CFR Part 50, App. R, Paragraph III.G.2, provides three acceptable methods to protect at least one shutdown train during a fire when redundant trains are located in same fire area
  - (a) 3-hr passive fire barrier
  - With fire detection and automatic suppression:
    - (b) 20-ft separation and no intervening combustibles
    - (c) 1-hr passive fire barrier
- Starting in 2000, the Reactor Oversight Process showed some licensees crediting unapproved operator manual actions for III.G.2 compliance

HISTORY (continued)

- In March 2003, NRC issued *Inspection Criteria for FP Manual Actions*
- In June 2003, NRC issued SECY-03-0100, *Rulemaking Plan on Post-Fire Operator Manual Actions*
- In Sept. 2003, the Commission issued an SRM approving "staff's recommendation to proceed with rulemaking … to revise the FP program requirements contained in Appendix R of 10 CFR Part 50 and the associated guidance."

HISTORY (continued)

- Following several Fall 2003 public meetings and a presentation to the ACRS FP Subcommittee, NRC issued *Post-Fire Safe Shutdown; Criteria for Determining Feasibility of Manual Actions,* in the Federal Register
  - Proposed acceptance criteria for "feasible" (and reliable) operator manual actions during an interim enforcement discretion period

ACCEPTANCE CRITERIA

- Following a 60-day period for public comments, the proposed acceptance criteria have been revised
  - Public (non-industry) comments were exclusively negative toward rulemaking
  - Industry comments felt rulemaking was too restrictive
  - Limited “substantive” comments on the criteria themselves

CRITERIA (continued)

- Operator manual actions – manipulation of components and equipment, typically at their location outside the main control room, to achieve and maintain post-fire safe shutdown.
- As for two of the current III.G.2 options, fire detection and automatic fire suppression shall be installed in the area where the fire occurs in order to credit operator manual actions.

CRITERIA (continued)

- Criteria address both "feasibility" (can it be done) and "reliability" (how well can it be done) of operator manual actions
  - Feasibility established by Demonstration criterion
    - The required operator manual actions shall be demonstrated through time-authenticated walk-downs utilizing a randomly-selected crew and equipment required to perform the actions during a fire. Documentation of the demonstration, as well as periodic operator training, shall be provided.

CRITERIA (continued)

- Reliability established by Time Margin criterion (formerly "Complexity and Number")
  - The analysis must contain a postulated fire time line assuring sufficient time to travel to action locations and perform actions required to achieve and maintain the plant in a hot shutdown condition. The fire time line shall extend from the time of initial fire detection until the time when the ability to achieve and maintain hot shutdown is reached, and include a time margin that accounts for all variables, including (a) differences between the demonstrated and actual conditions and (b) human performance uncertainties that may be encountered.

CRITERIA (continued)

- Remaining criteria support both feasibility and reliability of operator manual actions
  - Available Indications
  - Environmental Considerations, including Accessibility
  - Staffing and Training
  - Communications
  - Equipment, both Portable ("tools," e.g., ladders, SCBA) and Plant ("installed/fixed," e.g., valves)
  - Procedures

PATH FORWARD

- Time Margin to be refined through RES-facilitated expert elicitations among NRC/ contractor human factors analysts, NRC inspectors, and human reliability analysts
  - Two elicitations, April and May 2004
  - Results in draft Regulatory Guide, June 2004
- Proposed rule to be published in Federal Register in early 2005, accompanied by final draft Regulatory Guide addressing all criteria

NEI

NUCLEAR ENERGY INSTITUTE

Summary

- Circuit Failures
  - Background
  - NEI 00-01
  - Resumption of associated circuit inspections/RIS 2004-03
  - Issue resolution

Circuit Failures

- Background
  - Interpretive differences on regulations and regulatory guidance between industry and NRC
  - Risk-informed approach to resolution
  - Inspection moratorium/enforcement discretion
  - Industry fire testing of cables and circuits (EPRI Reports 1003326 and 1006961)
  - NEI 00-01 development

3

NEI 00-01

- NEI 00-01 provides a risk-informed approach intended for comprehensive issue resolution
- NEI 00-01 includes
  - Deterministic analysis method reflecting broad spectrum of plant licensing bases
  - Risk significance method to focus corrective action on any higher significance circuit failures and combinations
  - Method for licensees to address issues within the context of current and future (NFPA 805) regulations
  - Technical analysis of multiple high impedance faults indicating that this is not an issue of concern

4

Resumption of Associated Circuit Inspections

- Industry views
  - Risk-informed perspective provides better inspection focus (RIS 2004-03)
  - Need to clearly distinguish between
    - Compliance issues (licensing basis focus)
    - Risk significant issues (RIS/safety focus)
  - SDP needed that is capable of evaluating significance of circuit failure findings

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Resumption of Associated Circuit Inspections

- Industry actions
  - NEI 04-06, associated circuit self-assessment guidance
  - Pilot evaluations of NEI 04-06 at several plants prior to resumption of associated circuit inspections
  - All plants encouraged to self-assess associated circuit area prior to resumed inspections
  - All plants encouraged to address risk-significant findings through corrective action programs

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Circuit Failure Issue Resolution

- Industry seeks clearly stated regulatory expectations as the basis for issue closure
  - NEI 00-01 intended for this purpose
- Closure avenues need to be accessible to
  - Plants adopting the NFPA 805 risk-informed, performance-based rule changes
  - Plants retaining the current deterministic licensing bases