

March 26, 1998

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: DEVELOPMENT OF A RISK-INFORMED, PERFORMANCE-BASED REGULATION FOR FIRE PROTECTION AT NUCLEAR POWER PLANTS (WITS 9200197)

PURPOSE:

To respond to the staff requirements memorandum (SRM) dated September 11, 1997, related to SECY-97-127, "Development of a Risk-Informed, Performance-Based Regulation for Fire Protection at Nuclear Power Plants."

BACKGROUND:

On June 19, 1997, the staff submitted SECY-97-127, which described the actions it would pursue to develop a rulemaking for transitioning to a more risk-informed, performance-based structure for fire protection regulation of nuclear power plants. The benefits for this approach could be to evaluate the safety-impact of proposed plant changes in an integrated manner to reduce regulatory burden, and to identify areas where requirements should be increased.

SECY-97-127 also stated that a research plan would be developed to coordinate additional research to advance the state of the art in fire modeling and fire risk assessment methods.

In the associated SRM dated September 11, 1997, the Commission directed the staff to prepare an expedited schedule for rulemaking and transfer the responsibility for the rulemaking effort from the Office of Nuclear Regulatory Research (RES) to the Office of Nuclear Reactor Regulation (NRR). The Commission also directed the staff to complete the current research and study by the end of calendar year 1997 and to expedite the resolution of issues necessary to formulate a rule that will eliminate the need for most exemptions granted under Appendix R to 10 CFR Part 50. Finally, the Commission directed the staff to brief the Commission on the feedback from the Office of the General Counsel on backfit implications; industry feedback on the interest in a new rule; and all findings, observations, and conclusions related to fire modeling, probabilistic risk assessment (PRA), fire protection functional inspections (FPFI), individual plant examination of external events (IPEEE) results, and other relevant information.

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DISCUSSION:

In accordance with the SRM of September 11, 1997, the responsibility for the rulemaking effort has been transferred from RES to NRR. The staff is assessing the need for future additional research activities to complete any longer term items, or improvements to regulatory guidance in support of further risk-informed efforts. Additional research will be performed cooperatively with industry, when possible. An expedited schedule for rulemaking has been developed that would result in a draft rule and a draft regulatory guide being published for public comment 12 months after Commission approval to proceed, with a final rule and regulatory guide being submitted to the Commission in 18 months. The schedule with milestones is attached.

In accordance with the Commission's direction the staff has solicited industry feedback on their interest in a new rule. As part of this effort, the staff met with representatives of the Nuclear Energy Institute (NEI) at a public meeting on November 5, 1997. At this meeting, NEI presented the preliminary results of its survey of all Chief Nuclear Officers of operating reactors concerning the proposed rulemaking. The survey indicates that the industry positions are: (1) a new rule is neither desired nor necessary to assure safety; (2) industry will participate if rulemaking proceeds; (3) the rulemaking schedule must allow adequate time for completion of support elements, such as the FPFI and IPEEE programs, and (4) the use of risk/performance techniques has promise. If rulemaking proceeds, industry would prefer the option of continued compliance with the existing regulations, such as Appendix R to 10 CFR Part 50, including the existing approved exemptions, and the exemption approval process specified in 10 CFR 50.12. The survey results also provided industry's proposed alternatives to rulemaking. These are: (1) better communication with NRC to avoid differing interpretations; (2) more guidance on the preparation of engineering evaluations, such as those performed under 10 CFR 50.59 and Generic Letter (GL) 86-10, "Implementation of Fire Protection Requirements," (3) comprehensive clarification of the existing rule, staff positions, and various guidance documents, and (4) more allowance for risk significance evaluation within the current rule.

Representatives of NEI also presented these preliminary results at a meeting of the Advisory Committee on Reactor Safeguards (ACRS) on November 7, 1997, and formally provided the results to the staff in a letter dated December 11, 1997, to the Executive Director for Operations. Representatives of NEI provided additional detail on the results of the survey and their proposed interactions with the staff at a meeting of the ACRS fire protection subcommittee on January 22, 1998.

In a letter to Chairman Jackson dated November 7, 1997, George D. Miller, President of the National Fire Protection Association (NFPA), advised the Commission that NFPA is developing a performance-based standard for the fire protection of light-water reactors. The NFPA's position is that the NRC should adopt the standard, scheduled to be completed in May 2000, consistent with the direction provided in U.S. Government Circular Office of Management and Budget A-119 and Public Law 104-113 that encourages the adoption of national consensus standards by Government agencies to carry out their policy objectives or activities. Fire protection engineers from NRR participate on the technical committee that is writing the NFPA standard. The

goal of the proposed standard, specific to reactor safety, is to minimize the probability and effects of fires and explosions such that the facility can be safely operated without undue risk to the health and safety of the public and the environment. Representatives of NFPA presented their plan for the development of a performance-based fire protection standard for nuclear power plants at a meeting of the ACRS fire protection subcommittee on January 22, 1998.

At the ACRS meeting on November 7, 1997, the Union of Concerned Scientists (UCS) and the Nuclear Information and Resource Service (NIRS) presented their positions concerning the proposed fire protection rulemaking effort. These positions are: (1) the NRC should pursue rulemaking aimed at implementing fire protection regulations that apply equally to all its licensees; (2) risk-informed fire protection regulations should not be adopted if they rely on deficient risk assessments; (3) the NRC staff must fully document the technical basis for existing fire protection regulations as part of the rulemaking process, and (4) until the final fire protection rule is implemented, the existing fire protection regulations must be rigorously enforced.

OPTIONS:

On the basis of the feedback received from NEI, NFPA, NIRS, and UCS, the staff has developed three options related to the fire protection rulemaking effort for consideration by the Commission. As part of the evaluation, the staff has included the feedback from the Office of General Counsel on backfit implications of each option.

Option 1

On an expedited schedule, develop a performance-based, risk-informed fire protection regulation to replace the existing regulation. As part of this effort, the staff would develop a comprehensive regulatory guide that would provide for prescriptive and performance-based, risk-informed alternatives for compliance with the new rule.

Option 2

Defer rulemaking at this time. Rather, under this option, the staff would work with the NFPA and the industry to develop a performance-based, risk-informed consensus standard for fire protection for nuclear power plants. The staff could endorse the consensus standard in a rulemaking to serve as an alternative method of meeting NRC fire protection requirements. If the NFPA standard was determined not to be acceptable, the staff could pursue other performance-based, risk-informed rulemaking options. In parallel with the NFPA effort, the staff would develop a comprehensive regulatory guide that consolidates the existing staff positions, interpretations, and guidance related to fire protection, and would allow for the use of performance-based, risk-informed methods.

Option 3

Maintain the existing fire protection regulations and guidance.

EVALUATION:

Option 1

Under Option 1, the staff would develop a new fire protection rule based on experience to date as outlined in the attachment. If the Commission approves this option, the staff would solicit additional public and industry feedback during public meetings, and through Federal Register notices, as appropriate. (Based on planned interactions with the public and the industry, the staff would not conduct the public workshop described in SECY-96-134. On the basis of its past experience with fire protection issues, the staff believes that the elimination of the workshop at this point in the rulemaking process would not restrict participation by all interested parties.) It is expected that because these requirements would be performance-based and risk-informed, they could result in an improvement to our current regulatory approach to fire protection in that they will offer licensee's flexibility in meeting the safety objectives associated with fire protection, while also assessing fire risk from a broader basis that extends beyond the current design bases. Option 1 would provide a single set of licensing requirements for all operating reactors. It would also eliminate all of the existing exemptions from Appendix R to 10 CFR Part 50 and would eliminate the need for most future fire protection exemptions.

It is important to note that the Commission, when it promulgated Appendix R (February 19, 1981), recognized that there would be unique plant conditions under which the fire protection features identified by Appendix R would not significantly enhance the level of fire safety already provided by the licensee. Therefore, in those cases in which a fire hazard analysis could adequately demonstrate that the alternative fire protection features provided an equivalent level of fire safety to that required by Appendix R, the licensee could apply for an exemption under the provisions of 10 CFR 50.48(c)(6). Thus, the exemption process provided an alternative means of allowing flexibility to meet the performance objectives of Appendix R. Currently, the staff reviews approximately 10 exemption requests per year, the majority of which relate to the resolution of the Thermo-Lag issue. Licensees are permitted to make changes to their fire protection program without prior NRC approval, provided the change does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire or did not require an exemption, if the licensee has adopted the standard fire protection license condition described in GL 86-10. As noted above, industry has indicated it opposes any rulemaking. If rulemaking proceeds, industry prefers an approach that retains the option of continued compliance with the existing regulations, such as Appendix R to 10 CFR Part 50, including the existing approved exemptions, and the exemption approval process specified in 10 CFR 50.12. However, they have indicated their support for the NFPA proposal to develop a performance-based, risk-informed standard that will be endorsed by the NRC as an acceptable (although not mandatory) alternative to 10 CFR 50.48 and Appendix R.

One approach would be for the staff to develop a risk-informed, performance-based rule that would be imposed as an acceptable alternative to the current regulation. Because it would not be mandatory, it would not constitute a backfit under 10 CFR 50.109. However, if a risk-informed, performance-

based rule was made mandatory, the rule would constitute a backfit as defined in 10 CFR 50.109. It may be difficult to demonstrate that the rule falls within either the compliance exception or the adequate protection exceptions of Section 50.109(a)(4)(I)-(iii). Accordingly, a backfit analysis would have to be prepared demonstrating that the rule constitutes a cost-justified, substantial increase in safety. It is unclear at this time if the staff would be able to acceptably demonstrate that these criteria could be met.

Option 2

Option 2 could also achieve the benefits associated with adopting a performance-based, risk-informed approach to fire protection. If the Commission determines that the NFPA standard currently under development provides adequate protection of public health and safety, and represents an acceptable alternative to the current fire protection regulations, it could be adopted in a future rule as an alternative to the existing prescriptive requirements, consistent with the Commission's policy specified in Direction Setting Issue (DSI) 13, "The Role of Industry." The existing staff guidance related to fire protection is currently contained in numerous branch technical positions, generic communications, internal memorandums, and NUREG reports. Under this option, this guidance, and new or revised guidance on areas that the public, the staff, and the industry determine would benefit from additional clarification, would be provided in a single comprehensive regulatory guide. The proposed guide would allow the use of performance-based, risk-informed methods, as they mature, consistent with the guidance provided in Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," to satisfy the existing fire protection requirements. The experience gained from the PFFIs and IPEEEs would be considered in the development of the proposed guide and NFPA standard.

Under Option 2, any rulemaking would provide licensees an alternative to the current fire protection requirements set forth in 10 CFR 50.48 and 10 CFR Part 50, Appendix R (a comparable example would be 10 CFR Part 50, Appendix J, which includes two options either of which can be chosen for meeting the requirements for primary reactor containment leakage testing for water cooled power reactors). Accordingly, under that rulemaking there would be no backfitting concerns associated with this option.

A potential drawback, however, for any consensus standard approach is the potential for the standard not to meet the Commission's expectations or needs, as well as the potential for schedule slippage. If the Commission approves this option, the staff would keep the Commission informed and would consider alternatives if it became necessary.

At the ACRS Fire Protection Subcommittee meeting on January 22, 1998, and the ACRS full committee meeting on March 2, 1998, representatives of NEI and NFPA indicated their support for pursuing Option 2. The representative from NEI indicated at the March 2, 1998, ACRS meeting that industry opposes any rulemaking. If any rulemaking activity proceeds, industry prefers an approach that retains the option of continued compliance with the existing regulations, such as 10 CFR 50.48 and Appendix R to 10 CFR Part 50, including the existing approved exemptions, and the exemption approval process specified in 10 CFR 50.12.

Option 3

Option 3 would maintain the existing regulatory requirements and guidance without change.

If the Commission approves Option 3, the staff would cancel the performance-based, risk-informed fire protection rulemaking. In addition, the staff would not prepare the fire protection regulatory guides described under Options 1 and 2. The staff would continue to participate in the development of the NFPA standard described under Option 2; however, it would not endorse the NFPA standard through rulemaking or a regulatory guide. Nevertheless, the NFPA standard, when completed, may specify performance-based and risk-informed tools and methods that the licensees could use in the future to support (1) requests for exemptions from the existing requirements and (2) fire protection program changes that currently do not require prior NRC review and approval as discussed under Option 1. Since Option 3 preserves the existing regulatory requirements, there would be no backfitting concerns.

With Options 2 and 3, a minor rulemaking to revise Section III.M of Appendix R to 10 CFR Part 50 would be pursued to resolve the combustible penetration seal issue as proposed in SECY-96-146, "Technical Assessment of Fire Barrier Penetration Seals in Nuclear Power Plants." This rulemaking, which would likely be considered a relaxation, would not constitute a backfit.

RESOURCES:

The Office of Nuclear Reactor Regulation (NRR) resources for completing the activities described in Option 1 are estimated to require a total of 2 FTE over 2 years (FY 1998 and FY 1999 at 1 FTE per year) and \$500K (FY 1998). The resources for completing the activities described in Option 2 are estimated to require a total of 1 FTE and \$270K (FY 1998). No additional resources are required for Option 3. The NRR resources (FTE and dollars) for either Option 1 or Option 2 are not budgeted and would have to be reprogrammed. NRR will revise its Operating Plan to reflect necessary resource changes, completion of new activities, and the shift in priorities. This redirection would attempt to minimize the impact on other high priority tasks but may still have an affect on NRR fire protection activities such as NRR participation in the review of the remaining IPEEE submittals. Additionally, potential impacts may result from the need to assign key NRR fire protection expertise to the rulemaking and / or the development of the regulatory guide. The dollars would have to be reprogrammed from lower priority agency work.

The Office of Nuclear Regulatory Research (RES) has budgeted \$500K in FY 1998 and \$400K in FY 1999 for improving both fire models and risk assessment techniques. The staff is assessing the need for future additional research activities to complete any longer term items, or improvements to regulatory guidance in support of further risk-informed efforts. Additional resources, if necessary, will be addressed in the upcoming FY 2000 budget review.

Resource requirements for other NRC offices that may potentially support NRR activities in this area (e.g., OGC) are also dependent upon the option chosen, are expected to be minimal, and thus have not been quantified.

COORDINATION:

The Office of the General Counsel has no legal objections to this paper, and the Chief Financial Officer has reviewed this paper for resource implications and has no objections. The staff has provided a copy of this paper to the ACRS for information.

RECOMMENDATION:

Based primarily on the potential benefits that could be derived from a broad-based industry effort to product a comprehensive performance-based and risk-informed standard, the staff recommends that the Commission approve Option 2. This approach has the potential for leveraging considerable fire protection expertise toward this effort.

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Attachment: [Detailed Schedule with Milestones for Option 1.](#)

ATTACHMENT

Fire Protection Rulemaking Expedited Schedule (Option 1)

Milestones

1. Three Months after Commission Approval to Proceed
 - (a) - Information briefing for ACRS - Fire Protection Subcommittee.
 - (b) - Meetings with public and industry.
2. Three Months After Completion of Milestone 1
 - (a) - Complete regulatory framework document (rule straw man and performance-based, risk-informed regulatory guide outline).
 - (b) - Brief the ACRS Fire Protection Subcommittee
 - (c) - Brief CRGR
 - (d) - Provide interested parties (e.g., Nuclear Energy Institute and the public) with the proposed regulatory framework (consistent with DSI-13).
3. Three Months After Completion of Milestone 2
 - (a) - Complete the draft rule and performance-based, risk-informed regulatory guide based on feedback obtained during Milestone 2.
 - (b) - Brief the ACRS Fire Protection Subcommittee.
 - (c) - Brief CRGR
 - (d) - Brief ACRS Full committee.
4. Two Months After Completion of Milestone 3
 - (a) - Submit a draft rulemaking package to the Commission for approval to issue for public comment.
 - (b) - Brief the Commission on the draft rulemaking package (if requested).
5. One Month After Completion of Milestone 4
 - (a) - Publish rulemaking package for public comment.
6. Three Months After Completion of Milestone 5
 - (a) - Public comment period closes.
7. Two Months After Completion of Milestone 6
 - (a) - Complete resolution of public comments.
 - (b) - Prepare proposed final rule and regulatory guide
8. One month After Completion of Milestone 7
 - (a) - Brief ACRS Fire Protection Subcommittee
 - (b) - Brief CRGR
 - (c) - Brief ACRS Full Committee
9. One month After Completion of Milestone 8
 - (a) - Submit proposed final rule and regulatory guide for Commission approval.

(b) - Brief Commission (if requested).