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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Rules and Directives Branch
Office of Adminstration
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Institute of Electrical and Electronic Engineers (IEEE) Responses to Published Questions on the Advance Notice of Proposed Rulemaking (ANPR) on Proposed 10 CFR Part 53 (RIN 3150-AH81): Approaches to Risk-Informed and Performance-Based Requirements for Nuclear Power Reactors

Dear Sir or Madam:

The following comments on the Advance Notice of Proposed Rulemaking (ANPR) on Proposed 10 CFR Part 53 (RIN 3150-AH81) are submitted by the IEEE Nuclear Power Engineering Committee (NPEC). These comments were collected from the membership of NPEC Subcommittee 2 that has the responsibility for IEEE standards relating to qualifications. Because of the limited time available for response, these comments have not been balloted by NPEC and, therefore, do not represent a consensus position of NPEC.

It should be noted that IEEE Nuclear Power Engineering Committee has been active in updating standards to include risk-informed insights.

The following identify the NRC questions and the IEEE NPEC response.

NRC Question.

The NRC is seeking comments on the proposed described above:

1. Is the proposed plan to make a risk-informed and performance- based alternative to 10 CFR Part 50 reasonable? Is there a better approach than to create an entire new 10 CFR Part 53 to achieve a risk-informed and performance-based regulatory framework for nuclear power reactors? If yes, please describe the better approach?

IEEE NPEC response.

The proposed plan to make a risk-informed and performance-based alternative to 10 CFR Part 50 is not completely reasonable because it departs too far from the approximately 3,000 reactor-year experienced gained using the deterministic approach. The significant area of departure is the experienced gained in addressing common cause failure, which is not as evident as it should be in the risk-informed and performance-based alternative.

Template = SECY-067

SECY-02

Since the mid 1970's the nuclear standards, highlighted by Institute of Electrical and Electronic Engineers Std. 323, have developed proven methods for ensuring performance and enhancing reliability by qualification practices that address common cause failure. This lack of recognition for the research, analyses, testing, and qualification process in the risk-informed and performance-based alternative diminishes the performance-based regulatory framework for nuclear power reactors.

The regulatory framework for the risk-informed and performance-based alternative is too reliability centric. Reliability failure rate data is mainly based on normal service conditions.

The qualification process approach includes performance in normal service and also includes performance of actual installed equipment and replacement parts, performance during: off normal conditions, design basis event (DBE) conditions, post accident conditions, beyond DBE conditions, seismic conditions, radiation conditions, aging effects, synergisms, maintenance actions, and periodic testing, and demonstrates performance for each and every safety related function.

The qualification process approach also reduces risk by establishing a qualified life and mandatory requirements for design verification, Quality Assurance attributes from vendors, installation, maintenance, and replacement interval requirements.

A better approach would combine the strengths of the risk-informed process to identify scenarios and the important to safety equipment with the strengths of the qualification process to demonstrate performance under all conditions for the actual important to safety equipment for nuclear power reactors.

NRC Question.

2. Are the objectives, as articulated above in the proposed plan section, understandable and achievable? If not, why not? Should there be additional objectives? If so, please describe the additional objectives and explain the reasons for including them.

IEEE NPEC response.

Additional guidance and criteria are needed to address the demonstration of performance of safety related structures, systems, and components because the traditional method of demonstration performance included documentation that codes and standards had been met, including qualification documentation and the other special treatments. The alternative framework proposed appears to lessen the significance of nuclear codes and standards in ensuring performance of safety related structures, systems, and components. The role of nuclear codes in the performance process needs to be enhanced instead of lessened.

As an example, Figure 8-1 "Process for identification of requirements topics" does not list ANS, ASCE, ASME, or IEEE nuclear standards, which are the backbone of nuclear power plants in the USA. Nor does it show that these nuclear standards already include requirements and that NRC has endorsed these nuclear standards through the regulatory process. Figure 8-1 and the discussion show that other or additional requirements would be generated as part of the alternative framework, thus implying that existing nuclear codes and standards are not sufficient for future plants.

NRC Question.

3. Would the approach described above in the proposed plan section accomplish the objectives? If not, why not and what changes to the approach would allow for accomplishing the objectives?

IEEE NPEC response.

The approach would not accomplish the objectives because the approach does not properly address common cause failures, as has been addressed in the current 10 CFR Part 50, specifically

10 CFR Part 50.49 Equipment Qualification, nor does it recognize the Equipment Qualification process, including IEEE Std. 323 for addressing common cause failure.

IEEE Std. 323 was modified in 1974 to establish the methodology for addressing common cause failure, including age related degradation. IEEE Std. 323 has been periodically reviewed and updated to ensure that it reflects the state-of-the-art and maintains its international consensus. The latest version, IEEE Std. 323-2003, defines the current nuclear industry consensus of the methodology for addressing common cause failure. IEEE Std. 323-2003 includes risk informed insights, a graded approach, and additional mature positions on age related degradation management. IEEE Std. 323-2003significaantly enhances the reliability of safety related equipment since it reduces failure modes associated with age related degradation, radiation degradation, accident effects and seismic effects.

The proposed regulatory framework discusses approaches to common cause failure, which are not consistent with industry consensus standards and places an unrealistic expectation on reliability analysis.

The regulatory framework for the risk-informed and performance-based alternative is too reliability centric. Reliability failure rate data is mainly based on normal service conditions.

The qualification process approach includes performance in normal service and also includes performance of actual installed equipment and replacement parts, performance during: off normal conditions, design basis event (DBE) conditions, post accident conditions, beyond DBE conditions, seismic conditions, radiation conditions, aging effects, synergisms, maintenance actions, and periodic testing, and demonstrates performance for each and every safety related function.

The qualification process approach also reduces risk by establishing a qualified life and mandatory requirements for design verification, Quality Assurance attributes from vendors, installation, maintenance, and replacement interval requirements.

NRC Question.
4. Would existing licensees be interested in using risk-informed and performance-based alternative regulations to 10 CFR Part 50 as their licensing basis? If not, why not? If so, please discuss the main reasons for doing so.

IEEE NPEC response. No comment

NRC Question.
5. Should the alternative regulations be technology-neutral (i.e., applicable to all reactor technologies, e.g., light water reactor or gas cooled reactor), or be technology-specific? Please discuss the reasons for your answer. If technology-specific, which technologies should receive priority for development of alternative regulations?

IEEE NPEC response.
The alternative regulations should be both technology-neutral in the objectives, and technology cognizant in order to identify and characterize the risk from each technology.

Where natural phenomenon hazards are technology-neutral, internal hazards are technology specific. Thus, the risk to safety from both external hazards and internal hazards will be different depending on the technology. Technologies with lower risks should benefit with a graded approach in addressing external and internal hazards.

NRC Question.
6. When would alternative regulations and supporting documents need to be in place to be of most benefit? Is it premature to initiate rulemaking for non-LWR technologies? If so, when should

such an effort be undertaken? Could supporting guidance be developed later than the alternative regulations, e.g. phased in during plant licensing and construction?

IEEE NPEC response.
Alternative regulations and supporting documents need to be in place early to be of most benefit. Regulations and documents, which recognize risk significance and graded approaches, will foster designs that have less risk.

NRC Question.
7. The NRC encourages active stakeholder participation through development of proposed supporting documents, standards, and guidance. In such a process, the proposed documents, standards, and guidance would be submitted to and reviewed by NRC staff, and the NRC staff could endorse them, if appropriate. Is there any interest by stakeholders to develop proposed supporting documents, standards, or guidance? If so, please identify your organization and the specific documents, standards, or guidance you are interested in taking the lead to develop?

IEEE NPEC response.
The IEEE Nuclear Power Engineering Standards Committee has already commenced and is interested in continuing the lead to develop risk-informed performance-based standards and integration with existing standards.

B. Integration of Safety, Security, and Emergency Preparedness

The Commission believes that safety, security, and emergency preparedness should be integrated in developing a risk-informed and performance-based set of requirements for nuclear power reactors (i.e., in this context, 10 CFR Part 53). The NRC has proposed to establish security performance standards for new reactors (see SECY-05-0120, ADAMS Accession Number ML051100233). Under the proposed approach, nuclear plant designers would analyze and establish, at an earlier stage of design, security design aspects such that there would be a more robust and effective (intrinsic) security posture and less reliance on operational (extrinsic) security programs (guns, guards and gates). This approach takes advantage of making plants more secure by design rather than security components being added on after design.
As part of this approach, the NRC is seeking comment on the following issues:

NRC Question.
8. In developing the requirements for this alternative regulatory framework, how should safety, security, and emergency preparedness be integrated? Does the overall approach described in the technology-neutral framework clearly express the appropriate integration of safety, security, and preparedness? If not, how could it better do so?

IEEE NPEC response.
Safety and security should be integrated in the management process. Some industries and government agencies already have integrated safety management (ISM) systems that are all inclusive.

NRC Question.
9. What specific principles, concepts, features or performance standards for security would best achieve an integrated safety and security approach? How should they be expressed? How should they be measured?

IEEE NPEC response.
Safety and security should be integrated in the management process. Some industries and government agencies already have integrated safety management (ISM) systems that are all inclusive.

They should be expressed as risk categories.

They should be measured on a risk scale that includes frequency and consequence in unmitigated and mitigated designs.

NRC Question.

10. The NRC is considering rulemaking to require that safety and security be integrated so as to allow an easier and more thorough understanding of the effects that changes in one area would have on the other and to ensure that changes with unacceptable impacts are not implemented. How can the safety-security interface be better integrated in design and operational requirements?

IEEE NPEC response.

Safety and security should be integrated in the management process. Some industries and government agencies already have integrated safety management (ISM) systems that are all inclusive. These are effective in developing the safety-security interface in design and operation of nuclear facilities. ISM is particularly focused on identifying interface issues that have unacceptable impacts and eliminating or mitigating these unacceptable interactions. This is typically performed in a risk informed graded approach.

NRC Question.

11. Should security requirements be risk-informed? Why or why not? If so, what specific security requirements or analysis types would most benefit from the use of Probabilistic Risk Assessment (PRA) and how?

IEEE NPEC response.

Security requirements should be risk-informed because mitigation should be on a graded approach commensurate with the security risk. A security policy, which does not recognize risk and graded mitigation, would become ineffective potentially due to complacency and cost considerations.

NRC Question.

12. Should emergency preparedness requirements be risk-informed? Why or why not? How should emergency preparedness requirements be modified to be better integrated with safety and security?

IEEE NPEC response.

Emergency preparedness requirements should be risk-informed because preparedness is a component in mitigation, which should be on a graded approach commensurate with the emergency risk.

NRC Question.

43. Is the approach used to select and to safety classify structures, systems, and components reasonable? If not, what would be a better approach?

IEEE NPEC response.

The approach does not credit safety related equipment that is qualified to nuclear codes and standards. The approach uses the same failure rate for commercial equipment and qualified safety-related equipment. Methods should be developed to credit the qualification in determining safety classification and its performance. As an example, equipment that is seismically qualified to IEEE standards, which are designed to address common cause failures, are much less likely to experience performance degradation due to seismic events than non-qualified equipment.

NRC Question.

53. A completeness check was made on the topics for which requirements need to be developed for the new 10 CFR Part 53 (identified in Chapter 8) by comparing them to 10 CFR Part 50, NEI

02-02, and the International Atomic Energy Agency (IAEA) safety standards for design and operation. Are there other completeness checks that
should be made? If so, what should they be?

IEEE NPEC response.
The list of nuclear codes and standards from ANS, ASCE, ASME, and IEEE should be addressed and included in completeness checks.

I. Single Failure Criterion

In SECY-05-0138 (ML051950619), the staff forwarded to the Commission a draft report entitled ``Technical Report to Support Evaluation of a Broader Change to the Single Failure Criterion" and recommended to the Commission that any followup activities to risk-inform the Single Failure Criterion (SFC) should be included in the
activities to risk-inform the requirements of 10 CFR Part 50. The Commission directed the staff to seek additional stakeholder involvement. The report provides the following options: (1) Maintain the SFC as is, (2) risk-inform the SFC for design bases analyses, (3)
risk-inform SFC based on safety significance, and (4) replace SFC with risk and safety function reliability guidelines. The NRC is soliciting stakeholder feedback with regard to the proposed alternatives.

NRC Question.
60. Are the proposed options reasonable? If not, why not?

IEEE NPEC response.
IEEE Std 379-2000, "IEEE Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems" identifies IEEE's position on implementing the Single-Failure Criterion. The implementation of the SFC provides a reliability enhancement to safety related electrical systems and represents an industry consensus. Should the consensus determine changes based on risk insights, then the standard will be revised. Likewise other standards committees implement SFC in their standards. Each standards committee is in the best position to identify potential changes and the need to risk inform their SFC positions. Therefore, the opinion is to maintain the SFC.

NRC Question.
61. Are there other options for risk-informing the SFC? If so, please discuss these options.

IEEE NPEC response.
The SFC should be maintained and the standards committees should consider risk insights in future revisions to their SFC related codes and standards.

NRC Question.
62. Which option, if any, should be considered?

IEEE NPEC response.
The SFC should be maintained and the standards committees should consider risk insights in future revisions to their SFC related codes and standards.

NRC Question.
63. Should changes to the SFC in 10 CFR Part 50 be pursued separate from or as a part of the effort to create a new 10 CFR Part 53? Why or why not?

IEEE NPEC response.
Changes should be pursued separate from the new 10 CFR Part 53 and the standards committees should consider risk insights in future revisions to their SFC related codes and standards.

Because these are draft comments and are not the consensus position of the Nuclear Power Engineering Committee, please contact Mr. Jim Gleason at 702-821-7788 or by email at jim.gleason@glseq.com if you should have any questions.

Very truly yours,

John J. Disosway
Chairman
Nuclear Power Engineering Committee

cc: J. S. Malcolm, NPEC Vice Chairman
J. D. MacDonald, NPEC Secretary
S. K. Aggarwal, Subcommittee 2 Chairman
J. Gleason, Subcommittee 2.1 Chairman

From: Carol Gallagher
To: SECY
Date: Thu, Jan 11, 2007 11:31 AM
Subject: Comment on Approaches to Risk Inform & Performance-Base Requirements for NPRs ANPR

Attached for docketing is a comment letter on the above noted ANPR that I received via the rulemaking website on 1/10/07.

Carol

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Subject: Comment on Approaches to Risk Inform & Performance-Base Requirements for NPRs ANPR
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From: Carol Gallagher

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