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NUCLEAR UTILITY GROUP
ON EQUIPMENT QUALIFICATION

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August 29, 2003

Annette L. Vietti-Cook
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

ATTENTION: Rulemakings and Adjudications Staff

SUBJECT: Nuclear Utility Group on Equipment Qualification - Comments Concerning Proposed Rule - "Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors" (68 Fed. Reg. 26,511 (May. 16, 2003), RIN-3150-AG42)

Dear Ms. Vietti-Cook:

On behalf of the Nuclear Utility Group on Equipment Qualification ("NUGEQ" or "Group"),[1] we submit the enclosed comments in response to the referenced request for comments. We appreciate the opportunity to comment on the subject proposed rule concerning risk-informing the categorization and treatment of structures, systems, and components in nuclear power plants, including the environmental qualification ("EQ") requirements for certain equipment (10 C.F.R. § 50.49). Though the proposed rule is broader in scope, our comments

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[1] The NUGEQ is comprised of member electric utilities in the United States and Canada, including NRC licensees authorized to operate over 90 nuclear power reactors in the United States. The NUGEQ was formed in 1981 to address and monitor topics and issues related to equipment qualification, particularly with respect to the environmental qualification of electrical equipment pursuant to 10 C.F.R. § 50.49. NUGEQ submitted comments on the draft rule language in our letter of December 28, 2001.

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focus on the treatment of electrical equipment in lieu of the environmental qualification requirements of 10 C.F.R. § 50.49. In addition, the NUGEQ endorses and supports the comments submitted by the Nuclear Energy Institute ("NEI") on this proposed rule.

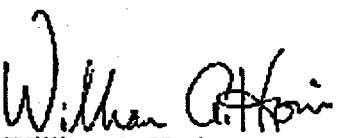
We commend the NRC for developing a proposed rule that would provide licensees with an opportunity to use the optional rule to relax or eliminate certain special treatment requirements through the categorization of structures, systems, and components ("SSCs") into levels of risk significance. In addition, we support the NRC's efforts to reduce the regulatory burden of certain requirements through the use of risk-informed insights. We agree that the cornerstone of the proposed rule is the establishment of a robust, risk-informed categorization process that provides high confidence that the safety significance of SSCs is correctly determined, considering all relevant information. We also agree with the use of general high-level treatment requirements, which provide licensees with the needed flexibility when determining treatment details for low risk-significant SSCs. In this manner, licensees electing to implement the rule may use innovative methods to establish alternate treatment to provide adequate assurance of continued functionality.

The NUGEQ agrees with the premise of the proposed rule that design bases requirements continue to apply to the low risk-significant SSCs, including the design requirements for environmental conditions. We agree with the NRC's conclusion that these design requirements, combined with the requirements contained in the proposed rule, are sufficient to provide reasonable assurance of precluding the simultaneous failure of low risk-significant SSCs in multiple systems, thereby maintaining assurance that a substantial safety hazard will not be created.

Regarding low risk-significant SSCs and the conditions under which these components must continue to be capable of perform their design functions, we maintain that the final rule should not include aging and synergism effects as design control requirements since these effects are uniquely elements of the special treatment provisions in 10 C.F.R. § 50.49, which no longer apply to the low risk-significant SSCs. In our enclosed comments, we explain why the Staff should remove the aging and synergism effects from the rule language before it is issued as a final rule. We also believe that the supplementary information is overly prescriptive in the discussion of NRC's expectations for the treatment of safety-related, low risk-significant components, and recommend that the discussion not be included in the final rule Statement of Considerations. Finally, we recommend the NRC also adopt as a longer-term action a review of NRC Staff requirements and guidance concerning degraded and non-conforming conditions and operability assessments in light of the risk-informed categorization process and other risk-informed initiatives.

Again, we appreciate the opportunity to comment and look forward to the completion of in this rulemaking process. Please contact us if you have any questions regarding our comments.

Sincerely,



William A. Horin
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Counsel to the Nuclear Utility Group on Equipment Qualification

Enclosure

Nuclear Utility Group on Equipment Qualification
Comments on Proposed Rule
10 C.F.R. § 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors"
August 29, 2003

I. Introduction

The proposed rule would provide licensees with an option to categorize structures, systems, or components ("SSCs") into classes based on their risk significance and whether or not they are safety-related.[1] For those safety-related, low risk-significant SSCs, licensees who elect to implement the proposed rule could reduce or eliminate certain special treatment requirements (as listed in the proposed rule), while continuing to ensure that these SSCs are capable of performing their design basis functions. The proposed rule is one of the NRC Staff's initiatives to risk-inform agency regulations, consistent with the Nuclear Regulatory Commission ("NRC" or "Commission") policy on the use of risk assessment methods[2] and its Fiscal Year 2000 – 2005 Strategic Plan performance goal to reduce unnecessary regulatory burden on stakeholders through the application of, *inter alia,* risk-informed initiatives.

The following comments concern the design basis for RISC-3 SSCs; the RISC-3 design control treatment; NRC guidance concerning operability and non-conforming conditions; and the NRC's "expectations" discussed in the supplementary information accompanying the proposed rule related to RISC-3 treatments. In summary, we recommend:

- deletion of "and effects (*i.e.,* aging and synergism)" in 10 C.F.R. § 50.69(d)(2)(i);
- deletion or clarification of the discussion in Section V.5.2.1 regarding justification as part of design control for operating electrical equipment beyond its design life;
- elimination of the information in Section V.5.2.1 regarding "expectations" for RISC-3 treatments from the final rulemaking; and

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1 The four categories of risk-informed safety class ("RISC") SSCs are: RISC-1 (safety-related SSCs that perform safety-significant functions); RISC-2 (nonsafety-related SSCs that perform safety-significant functions); RISC-3 (safety-related SSCs that perform low safety-significant functions); and RISC-4 (nonsafety-related SSCs that perform low safety-significant functions).

2 "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities; Final Policy Statement," 60 Fed. Reg. 42,622 (Aug. 16, 1995).

- consideration that the NRC Staff include in its long-term planning a review of requirements and guidance concerning nonconforming conditions and operability, in light of risk-informed initiatives.

II. Comments

We support the intent of the proposed rule to reduce regulatory burden using risk-informed insights. Our suggestions below support burden reduction while maintaining safety, and are consistent with the overall objectives and intent of this rulemaking. In addition, we support the use of industry guidelines (as endorsed by the NRC in regulatory guidance) providing one or more acceptable means for implementing specific provisions of the rule.

A. Eliminate *Aging and Synergism Effects* From 10 C.F.R. § 50.69(d)(2)(i)

The NUGEQ disagrees with the inclusion of "aging" and "synergism" effects as design requirements in proposed 10 C.F.R. § 50.69(d)(2)(i).[3] The NUGEQ agrees that the design functional requirements and bases of RISC-3 SSCs, including design requirements for environmental conditions, must be maintained and controlled. One significant reason for our objection is that "aging" and "synergism" effects are not currently design requirements for SSCs; rather, they are elements of the special treatment required by 10 C.F.R. § 50.49.[4] Further, the current language of proposed 10 C.F.R. § 50.69(d)(2)(i) appears to require consideration of "aging" and "synergism" effects for all RISC-3 SSCs, including structural, mechanical, and electrical components, and not just those SSCs currently subject to 10 C.F.R. § 50.49 treatment requirements. We believe that this language imposes an unnecessary and unintended burden on licensees who elect to implement the proposed rule.

It is possible that the staff intended to limit consideration of "aging" and "synergism" effects to RISC-3 electrical equipment that would have otherwise been within the scope of 10 C.F.R. § 50.49. Although revising the proposed rule language could limit the consideration of these effects to such RISC-3 electrical equipment, the NUGEQ maintains that specifying these effects as design requirements is incorrect and unnecessary for any RISC-3 SSCs. The basis for our conclusion is discussed further below.

1. The *Aging* Provisions of 10 C.F.R. § 50.49 are Special Treatment

The *aging* provisions of 10 C.F.R. § 50.49 require that the equipment qualification testing method, a special treatment, include the sequential application of

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[3] 68 Fed. Reg. at 26,550.

[4] 10 C.F.R. § 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants."

age-preconditioning and then accident simulation conditions to the equipment test specimens. This special treatment testing provides added assurance by demonstrating (through testing) required functions during accident test conditions after the potentially degrading effects of in-service aging. These provisions also require specific actions (*e.g.*, replacement, repair) when installed equipment reaches the aging limit demonstrated by the qualification methods prescribed by the rule. While these rigorous qualification methodologies may be appropriate for equipment within the scope of 10 C.F.R. § 50.49, they are neither necessary nor appropriate for the low risk-significant equipment in the RISC-3 category.

We agree with the discussion in Section III.4.2 regarding 10 C.F.R. § 50.49 and GDC-4,[5] the need for RISC-3 SSCs to remain capable of performing safety functions under design basis conditions, and the continued applicability of GDC-4 and the associated design basis environmental conditions.[6] We also agree with repeated statements (*see, e.g.*, Section III.3.2[7]) that (1) the high-level design control and procurement requirements focus on establishing design capability when RISC-3 equipment is replaced; and (2) continued confidence that RISC-3 SSC will be able to perform design basis functions is achieved by inclusion of high-level requirements for maintenance, inspection, test, and surveillance. Consequently, aging effects need not be specified as a design requirement since the selection of suitable materials is an integral part of the design and procurement processes, and the other high-level treatments provide adequate assurance of continued capability.

2. The *Synergistic Effects* Provisions of 10 C.F.R. § 50.49 are Special Treatment

10 C.F.R. § 50.49(e)(7), "Synergistic Effects," was integrated into Section 50.49 to address potential second-order effects associated with special treatment qualification test methods that used accelerated age-preconditioning followed by a simulation of accident conditions. Synergistic effect concerns were raised during the environmental qualification ("EQ") rulemaking based on some research testing results which suggested that, for certain material formulations, the combined effects of the sequential application of accelerated aging conditions (*e.g.*, thermal aging followed by radiation aging) during qualification tests might be less degrading than their simultaneous application in actual plant applications. As a result, 10 C.F.R. § 50.49(e)(7) was incorporated into the final EQ rule. Importantly, 10 C.F.R. § 50.49 and associated regulatory guidance do not require consideration of synergisms for all equipment covered by the EQ rule. Synergisms need not be considered for any equipment that is qualified to

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5 General Design Criteria "(GDC") Criterion 4, "Environmental and Dynamic Effects Design Bases" (10 C.F.R. Part 50, Appendix A).

6 68 Fed. Reg. at 26,523.

7 68 Fed. Reg. at 26,517.

the "DOR Guidelines" or "NUREG-0588, Category II".[8] This regulatory flexibility was based, in part, on a recognition that (1) "synergistic effects" is a secondary consideration that did not warrant additional licensee activities for equipment already qualified to the "DOR Guidelines" or "NUREG-0588, Category II;" and (2) other conservatisms in the qualification process, including conservatisms when defining environmental conditions, provided adequate confidence in equipment capability.

According to Regulatory Guide 1.89, Regulatory Position C.5.a, the Staff identified synergistic effects known at the time as dose rate effects and radiation and temperature sequencing effects.[9] Both of these effects are related to radiation aging and the sequential accelerated aging simulations that are used as part of the qualification test method specified by 10 C.F.R. § 50.49 and IEEE 323-1974.[10] This sequential testing methodology is clearly a special treatment that should not apply to RISC-3 equipment. As a practical matter, licensee considerations of such known synergistic effects have not materially affected qualification test-based aging or accident qualification conclusions.

We agree with the Section III.4.2 discussion regarding 10 C.F.R. § 50.49 and GDC-4, the need for RISC-3 SSCs to remain capable of performing safety functions under design basis conditions, and the continued applicability of GDC-4 and the associated design basis environmental conditions.[11] We also agree with repeated statements (*see, e.g.,* Section III.3.2[12]) that (1) the high-level design control and procurement requirements focus on establishing design capability when RISC-3 equipment is replaced, and (2) continued confidence that RISC-3 SSC will be able to perform design basis functions is achieved by inclusion of high-level requirements for maintenance, inspection, test, and surveillance. Consequently, synergistic effects should not be specified as a design requirement since the selection of suitable materials is an integral part of the design and procurement processes and the other high-level treatments provide adequate assurance of continued capability.

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8 *See, e.g.,* NUREG-0588, Rev. 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment" (Nov. 1980), p. 15.

9 Regulatory Guide ("RG") 1.89, Rev. 1, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants" (June 1984), at 5.

10 *See* RG 1.89, citing IEEE 323-1974, "IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations" (Feb. 28, 1974).

11 68 Fed. Reg. at 26,523.

12 68 Fed. Reg. at 26,517.

3. Aging and Synergism Effects are not Part of the General Design Criteria

As a special treatment, 10 C.F.R. § 50.49 was issued to provide additional requirements (*i.e.*, beyond those established by prior regulations) for that subset of electrical equipment important-to-safety and exposed to harsh environmental conditions during postulated accidents.[13] The most relevant of these prior regulations with respect to environmental considerations is GDC-4, which applies to all SSCs important to safety. GDC-4 requires these SSCs to be "designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents." Neither GDC-4 nor other regulations which specify the design basis for SSCs require consideration of "aging or synergistic effects" as design considerations, and these fundamental design regulations should not be expanded to apply such consideration for RISC-3 SSCs through the proposed rule.

Our views regarding "aging and synergistic effects" not being design requirements are consistent with the information provided in Section III.4.2, "Section 50.49 Environmental Qualification of Electrical Equipment." This section appropriately states: "[t]he requirements from GDC-4 as they relate to RISC-3 and RISC-4 SSCs, and the design basis requirements for these SSCs, including the environmental conditions such as temperature and pressure, remain in effect. Thus, these SSCs must continue to remain capable of performing their safety-related functions under design basis environmental conditions." Aging and synergism effects are neither environmental conditions nor design requirements.

Although 10 C.F.R. § 50.49 provides detailed programmatic requirements for certain electrical equipment, GDC-4 has remained the governing regulation regarding environmental design for other SSCs, including mechanical equipment and mild environment electrical equipment. In essence, the promulgation of 10 C.F.R. § 50.49 resulted in two sets of requirements regarding environmental capability – 10 C.F.R. § 50.49 for certain electrical equipment exposed to harsh postulated accident conditions, and GDC-4 for all SSCs. With the promulgation of Section 50.69 and the elimination of Section 50.49 as a special treatment for RISC-3 equipment, the design basis remains unchanged and GDC-4 still applies to all RISC-3 equipment. While GDC-4 requires compatibility with environmental conditions, it does not explicitly require consideration of "aging effects" or "synergistic effects."

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[13] According to the Statement of Considerations accompanying 10 C.F.R. § 50.49 (48 Fed. Reg. 2,729 (Jan. 21, 1983)), these prior regulations include GDC-1, "Quality standards and records," GDC-2, "Design bases for protection against natural phenomena," GDC-4, "Environmental and dynamic effects design bases," GDC-23, "Protection system failure modes," and Appendix B, Criterion III, "Design Control," and Criterion XI, "Test Control."

For electrical equipment outside the scope of Section 50.49 and for mechanical equipment, licensee activities which establish compliance with the design requirements of GDC-4 include the selection, procurement, and use of materials capable of performing under the specified conditions coupled, where needed, with testing, analysis, or other methods to confirm this design capability. These GDC-4 compliance activities, in conjunction with operation, maintenance, and periodic testing in accordance with other regulations and requirements (including the maintenance rule), have adequately established the continued capability of these SSCs (including mechanical devices) to function under actual and postulated environmental conditions. With the promulgation of Section 50.69, this general approach can be applied to all RISC-3 SSCs, at an appropriate level of confidence based on risk significance. In summary, existing design basis requirements applicable to all SSCs do not explicitly require consideration of aging and synergistic effects. Yet, the design process has adequately established the environmental compatibility of SSC designs, and other processes provide adequate assurance of continued capability. Consequently, the aging and synergism effects language should be removed from Section 50.69(d)(2)(i).

Finally, we agree with the Section III.4.1 observation that multiple simultaneous failures of RISC-3 components, in the same or in different systems, is not a concern.[14] The NRC appropriately notes that, even for components of the same type, simultaneous failure of multiple components are unlikely since installed components are not identical in terms of their specific characteristics or operating and maintenance history.[15] Further, there are high-level requirements to collect data about performance of the SSCs, to review the data to determine if adverse performance is occurring, and to take appropriate action (*e.g.*, correct failures and adjust treatment processes). Consequently, degradation or problems affecting a component type would be detected and dealt with before multiple failures become likely. These considerations provide further assurances that the special treatment provisions of 10 C.F.R. § 50.49 regarding aging and synergisms are not necessary for RISC-3 equipment.

B. The Section V.5.2.1 Statement Regarding a Beyond-Design-Life "Expectation" for Electrical Equipment is Ambiguous and Appears to be Unwarranted

Section V.5.2.1, "Section 50.69(d)(2)(i) Design Control Process," states, "[f]urther, if RISC-3 electrical equipment is relied on to perform its safety-related function beyond its design life, licensees should have a basis justifying the continued capability of the equipment under adverse environmental conditions."[16] This analysis

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14 68 Fed. Reg. at 26,520.

15 *Id.*

16 68 Fed. Reg. at 26,542 (emphasis added).

and suggested design considerations appear to be unwarranted. The basis for this NRC "expectation" is unstated, and is specifically limited to RISC-3 electrical equipment.

The limitation suggests that the NRC's "expectation" has a basis in the "qualified life" requirement, which was initially implemented to establish compliance with 10 C.F.R. § 50.49 for those electrical devices required to function when exposed to the harsh environment conditions associated with postulated accidents (which would not include all RISC-3 electrical equipment). Assuming this is correct, we have the following objections to this expectation for RISC-3 electrical SSCs:

- As noted in a previous comment, the *aging* provisions of 10 C.F.R. § 50.49 are a special treatment, including the provisions requiring specific actions (*e.g.*, replacement, repair) when installed equipment reaches the aging limit demonstrated by the prescribed qualification methods. These special treatments are neither required nor appropriate for RISC-3 equipment if the high-level objectives of the alternate treatments are implemented. While the rigorous qualification methodologies specified by 10 C.F.R. § 50.49 may be appropriate for equipment which remains within the scope of the EQ rule, they are neither necessary nor appropriate for the low risk-significant equipment in the RISC-3 category.

- The high-level design control and procurement requirements focus on establishing design capability when RISC-3 equipment is replaced (*see* Section III.3.2[17]) and need not establish specific design life values.

Continued confidence that RISC-3 electrical devices will be able to perform design basis functions is achieved by inclusion of high-level requirements for maintenance, inspection, test, and surveillance. As part of achieving this continued confidence, periodic replacement or repair intervals may be used, based on a variety of considerations. These intervals are not considered design basis requirements. The language noted above, however, suggests that they are design basis requirements, *i.e.*, a "design life" requirement. According to Section V.5.2.3,[18] as part of proposed 10 C.F.R. § 50.69(d)(2)(iii), the NRC expects licensees to identify preventive maintenance needed to preserve RISC-3 SSC functional capability; but it is important to note that such intervals as may be established are not part of the design basis requirements.

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17 68 Fed. Reg. at 26,517.

18 68 Fed. Reg. at 26,543.

C. The Section V.5.2.1 "Expectations" are Inconsistent with the Proposed Rule's High-Level Treatment Objectives

In Section V.5.2 of the supplementary information accompanying the proposed rule, the NRC discusses alternate treatment methods.[19] While we agree that some explanation of the proposed rule requirements is appropriate, the discussion is overly prescriptive and could be construed as inappropriately modifying or expanding on the actual regulatory requirements. For example, the discussion includes NRC "expectations" for developing and evaluating RISC-3 treatment that are more appropriately considered regulatory guidance for acceptable methods of implementing the requirements.

The proposed rule specifies the high-level treatment requirements for RISC-3 SSCs. If the NRC considers it necessary to suggest acceptable methods for determining appropriate treatment methods, then the NRC should include this information in a regulatory guide. By including such prescriptive language in the supplementary information accompanying the proposed rule, it appears that the NRC is attempting to establish requirements for interpreting the proposed rule without including such requirements in the actual regulatory text. We recommend that the NRC retain the proposed rule language, but delete the prescriptive information from the supplementary information.

D. The Staff Should Consider, in Conjunction with the Overall Risk-Informed Initiatives, Addressing the Potential Implications of These Initiatives for Requirements and Guidance Regarding Degraded and Non-Conforming Conditions and Equipment Operability

In order to ensure consistency of the overall NRC regulatory scheme with risk-informed initiatives, we urge the NRC to consider the potential for the risk-informed efforts generally, and the effort related to the categorization of SSCs specifically, to affect the processes for determining operability of components when degraded or non-conforming conditions are identified.[20] Accordingly, we recommend that, as a longer-term action, the NRC establish a mechanism for addressing the need for changes or clarifications in regulations or guidance in order to properly apply risk-informed insights

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19 68 Fed. Reg. at 26,540.

20 NRC Generic Letter 91-18, "Information ... Regarding Two NRC Inspection Procedures On Resolution of Degraded and Nonconforming Conditions and On Operability" (Nov. 7, 1991), and Generic Letter 91-17, Revision 1, "Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions" (Oct. 8, 1997).

in the operability processes that would be consistent with application of the risk-informed initiatives.[21]

[21] We recognize that the NRC Staff has ongoing actions to review and revise its guidance concerning degraded and nonconforming conditions and equipment operability. We do not suggest that this activity be delayed to include risk-informed insights at this time. Rather, risk considerations should ultimately be considered in the context of equipment operability guidance.