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NUCLEAR UTILITY GROUP  
ON EQUIPMENT QUALIFICATION

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July 2, 2001

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U.S. Nuclear Regulatory Commission  
Mail Stop T-06 D59  
Washington, DC 20555-0001

**Re: Comments Concerning Reducing Unnecessary Regulatory Burden While Maintaining Safety, 66 Fed. Reg. 22, 134 (2001)**

Dear Mr. Meyer:

In the referenced *Federal Register* Notice of May 3, 2001, the U.S. Nuclear Regulatory Commission ("NRC") Staff (the "Staff") requested comments concerning the NRC Staff's initiatives for reduction of unnecessary regulatory burden while maintaining safety. 66 Fed. Reg. 22,134 (2001). The comments provided below are submitted on behalf of the Nuclear Utility Group on Equipment Qualification ("NUGEQ").<sup>1</sup> These comments, as specifically set forth in the Enclosure to this letter, reflect a number of potential regulatory improvements related to licensee 10 CFR 50.49 compliance efforts that could reduce significantly many of the unnecessary burdens imposed on licensees by the current equipment qualification regulatory scheme.

Importantly, most of these suggested improvements can be achieved without a significant dedication of NRC or industry resources. Many involve clarification of existing NRC equipment qualification guidance, or interpretations of that guidance. Many of the comments take into account risk-perspectives in the application of that guidance. We suggest that the NRC

<sup>1</sup> The NUGEQ is comprised of over 30 utilities, each owning and operating one or more nuclear power reactors. The NUGEQ was founded in 1981 to address legal and technical issues related to the qualification of equipment (primarily electrical). The Group regularly interacts with the NRC and industry organizations, including NEI, in addressing questions related to equipment qualification. With these comments the NUGEQ also wishes to express its support for the comments being filed by NEI.

Template = ADM-013

E-RIDS-03

Att = M. Karabernikoff  
(CMMK)

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could, with minimal effort, address many of these topics through one or more generic communications to licensees that would serve, in effect, as line item improvements related to equipment qualification guidance. It should be unnecessary to review and amend in toto the underlying guidance documents to adopt these specific recommendations.

In addition, some of the suggested improvements contained in the Enclosure reflect methods of incorporating risk-perspectives into equipment qualification requirements reflected in 10 C.F.R. §50.49. These suggestions may ultimately be appropriate for consideration in the context of Option 3, Changes to Technical Requirements, of the NRC's risk-informed regulatory initiative. However, the NUGEQ does not believe it is essential to await the final outcome of that initiative to accommodate the application of all of these specific recommendations. We respectfully suggest that the NRC consider also adopting, through appropriate exemptions by individual licensees, those particular items that ultimately would involve generic regulatory changes. In fact, these actions could serve as pilot-type efforts in this regard.

We note that for the most part, the suggestions set forth in the Enclosure were originally raised in the context of the NRC's 1993 burden reduction initiative, then-labelled the "Program for Elimination of Requirements Marginal to Safety." At a workshop conducted on April 27 and 28, 1993, the NUGEQ sponsored a panel of industry representatives and experts to address equipment qualification. The recommendations in the Enclosure are derived substantially from the recommendations made in 1993. We note that some of the other recommendations have come to pass (e.g., application of a revised source term). Nonetheless, we believe that the recommendations in the Enclosure remain valid and are perhaps even more important today as licensees must be more cost-conscious while continuing to assure plant safety.

Finally, we would welcome an opportunity to meet with interested members of the Staff to address these topics, and to focus the discussions on the best means to address each suggestion. Please feel free to contact the Group, through the undersigned counsel, at 202-371-5737 or [whorin@winston.com](mailto:whorin@winston.com).

Respectfully submitted,



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

Enclosure

**Comments of the Nuclear Utility Group on Equipment Qualification**

**Reducing Unnecessary Regulatory Burden  
Associated with Equipment Qualification  
July 2, 2001**

**1. Focus on Risk-Significant Periods for Long-Term Post Accident Operability**

**Discussion:** The operating time provisions of 10 CFR 50.49 should be limited to the 'mitigation phase' and possibly certain risk-significant equipment operations during the 'recovery phase' of applicable accidents. Based on 10 CFR 50.49 and NRC guidance document statements regarding the need to qualify equipment for the "duration of the accident function," licensees have established operating times for equipment operating in the 'accident recovery' phase that range from 30 days to over 1 year. Numerous risk-based documents, including the NRC-sponsored NUREG/CR-5313, *EQ Risk Scoping Study*, indicate that the risk significant period is limited to the first days of an accident (i.e., accident mitigation phase) and EQ issues associated with long term post-accident equipment operability are not risk significant. Accordingly, the operating time provisions of 10 CFR 50.49 should be interpreted as being limited to the first few days or weeks post-accident. For equipment that could be used as part of long-term accident recover actions, equipment operability should be addressed under accident management or plant recovery actions. If risk based insights identify risk significant equipment operations during the recovery phase then the qualification provisions of 50.49 could be selectively applied to such equipment as appropriate.

**Regulatory Basis:**

10 CFR 50.49  
Regulatory Guide 1.89, Rev. 1  
NUREG-0588  
DOR Guidelines

**Burden Reduction & Benefits:** Licensees currently must demonstrate long-term post-accident operability for certain equipment as part of their EQ program. However, the accident simulation portion of most 10 CFR 50.49 qualification tests is typically 30 days or less but yet is more severe than the licensing basis 'required accident profile.' Accordingly, this effort generally involves an analytical evaluation of differences between these profiles as a basis to establish longer operability for the less severe 'required accident profile.' This analysis must be revised for all affected equipment anytime a revised accident analysis results in modifying the qualification profile used for establishing qualification. A new analysis must also be generated whenever a new type of equipment requires the development of an EQ file. A burden reduction would be achieved if licensees could eliminate these analytical exercises.

Currently there is no uniform guidance from either the NRC or the IEEE on the duration of LOCA accident simulation tests. Consequently, for inside containment equipment requiring long-term operability most test durations have ranged from 2 weeks to over 100 days. The U.K., French and Germany requirements specify a LOCA steam simulation duration of approximately 2 weeks. A burden reduction would be achieved if generic guidance based on risk-insights were available specifying the maximum LOCA simulation test duration (e.g., 2 weeks).

Several NUGEQ documents provided to the NRC contain additional information on the low risk significance of equipment qualification for the recovery period. These include a January 11, 1999, NUGEQ paper submitted to the NRC on the use of Arrhenius methods to analyze accident conditions and the NUGEQ comments on the Draft Regulatory Guide on the alternate source term, dated March 31, 2000.

***Recommended Resolution Path:*** Issue an RIS (or similar generic communication) clarifying the NRC position regarding qualification for the accident recovery phase. The RIS could state that using risk-informed considerations 10 CFR 50.49 compliance regarding qualification for the duration of the required function is generally limited to the accident mitigation phase. For LOCA accidents, qualification tests of a 2 week duration would adequately encompass the risk significant component of the mitigation phase. In addition, were certain equipment whose actions during an extended recovery phase are considered risk significant, 10 CFR 50.49 qualification could apply. For other equipment potentially used during the recovery phase, operability should be addressed under accident management or plant recovery program actions.

## **2. Permit Graded Qualification Methods Based on Equipment Risk Significance**

***Discussion:*** 10 CFR 50.49 and related guidance documents establish uniform qualification methods for demonstrating compliance. They do not currently provide flexibility for the use of methods that would provide a graded level of assurance commensurate with equipment risk significance. Modifications to the regulatory scheme should be made to permit alternative, possibly innovative, methods of assuring equipment performance that would be applied based on the risk significance of the equipment items for those accidents producing harsh conditions.

### ***Regulatory Basis:***

10 CFR 50.49  
Regulatory Guide 1.89, Rev. 1  
NUREG-0588  
DOR Guidelines

***Burden Reduction & Benefits:*** By establishing and maintaining qualification based on safety significance, licensees would be able to more effectively utilize their EQ resources. Licensees would continue to implement currently approved methods for the risk

significant equipment but would apply more cost-effective and resource-effective methods for less safety significant equipment.

**Recommended Resolution Path:** Revise 10 CFR 50.49, as necessary, and NRC EQ guidance documents permitting licensees to establish and maintain qualification using methods, including innovative approaches, that establish adequate assurance based on the risk-significance of the associated equipment functions. In lieu of revising and reissuing the guidance documents the NRC could issue a generic communication (e.g., RIS) that would supplement and clarify the existing guidance in a manner similar to the line item technical specification improvement program.

### **3. Permit Graded Qualification Methods Based on Severity of Accident Environment**

**Discussion:** 10 CFR 50.49 and related guidance documents establish uniform methods for demonstrating compliance. They do not currently provide flexibility for the use of methods that would provide a graded level of assurance commensurate with the severity of the environmental conditions experienced by particular equipment. Currently, a two tiered approach applies. For safety-related equipment outside the scope of 10 CFR 50.49 (i.e., mild equipment), equipment selection, application, operation and performance reviews are considered acceptable methods of demonstrating operability. For equipment exposed to 'harsh' conditions (i.e., conditions significantly more severe than normal) the 10 CFR 50.49 methods must be used regardless of the degree of environmental severity. Modifications to the regulatory scheme should be made to permit alternative methods for equipment qualification within the scope of 10 CFR 50.49 that would be applied based on the relative severity of the harsh accident conditions experienced by the specific equipment. The most rigorous methods would be applied for LOCA conditions inside primary containment.

**Regulatory Basis:**

10 CFR 50.49  
Regulatory Guide 1.89, Rev. 1  
NUREG-0588  
DOR Guidelines

**Burden Reduction & Benefits:** By establishing and maintaining qualification based on the severity of the accident conditions, licensees would be able to more effectively utilize their EQ resources. The most rigorous qualification methods would be applied for those LOCA/HELB conditions inside primary containment which significantly challenge the functionality of electrical equipment. Licensees would apply more cost-effective and resource-effective methods for those accident conditions that do not significantly challenge equipment functionality, such as relatively moderate temperature increases due to loss of ventilation. By lowering the qualification cost barrier, modern, innovative equipment designs could be effectively utilized to increase overall equipment performance and plant safety.

**Recommended Resolution Path:** Revise 10 CFR 50.49, as necessary, and NRC EQ guidance documents permitting licensees to establish and maintain qualification using methods, including innovative approaches, that establish adequate assurance based on the severity of the accident environmental conditions and their challenge to the functionality of specific equipment. In lieu of revising and reissuing the guidance documents the NRC could issue a generic communication (e.g., RIS) that would supplement and clarify the existing guidance in a manner similar to the line item technical specification improvement program.

#### **4. Alternative Qualification Methods for Equipment Exposed to Radiation-Only Harsh Conditions**

**Discussion:** (This item is a subset of the previous comment.) 10 CFR 50.49 limits the scope of its applicability to certain electrical equipment exposed to "harsh" accident conditions (i.e., those significantly more severe than conditions occurring during normal operation, including anticipated operational occurrences). For certain equipment, particularly some equipment located outside primary containment, the only "harsh" accident condition that is significantly more severe is radiation. This equipment has been termed "radiation-only harsh" equipment. For newer plant equipment (i.e., equipment that cannot be qualified using the guidance of the DOR Guidelines or NUREG-0588 Cat. II) the NRC and some licensees have interpreted the 10 CFR 50.49 provisions and staff guidance documents as requiring full qualification sequential type testing including aging simulations. However, adequate assurance of operability can be established using less burdensome methods, such as evaluations based on existing radiation tolerance data for the materials of construction, that comply with 10 CFR 50.49(f)(4).

**Regulatory Basis:**

10 CFR 50.49

Regulatory Guide 1.89, Rev. 1

**Burden Reduction & Benefits:** The type test qualification method, including preaging to an end of life condition, is unnecessarily burdensome for certain components exposed to "radiation-only harsh" accident conditions. For much of this equipment adequate assurance of performance during the accident exposure could be achieved with a thorough evaluation of equipment functions and materials combined with existing data on material radiation tolerance. By lowering the qualification cost barrier, modern, innovative equipment designs could be effectively utilized to increase overall equipment performance and plant safety.

**Recommended Resolution Path:** Issue an RIS (or similar generic communication) clarifying the NRC position regarding qualification for radiation-only harsh conditions. For equipment whose only accident harsh condition is radiation, the RIS could state that adequate qualification can be established using analysis combined with partial test data in accordance with 10 CFR 50.49 (f)(4).

## **5. Permit Use Realistic (Best-Estimate) Methods to Define Accident Environment Steam Conditions**

**Discussion:** LOCA/HELB steam/temperature/pressure conditions are currently based on very conservative, deterministic DBA assumptions including a DEGB of the largest RCS pipe. Some of these events and associated conditions are highly improbable based on fracture mechanic (leak-before-break) considerations. Currently acceptable methods of establishing environmental conditions for qualification are based on these highly improbable events combined with conservative assumptions and codes, such as those used for containment design. The cumulative effect is unrealistic environmental conditions that are not representative of the risk-significant conditions that could challenge equipment safety functions. More realistic environmental conditions should be developed based on consideration of risk significant events, fracture mechanics information, and best estimate environmental analyses.

**Regulatory Basis:**

10 CFR 50.49

Regulatory Guide 1.89, Rev. 1

NUREG-0588

DOR Guidelines

**Burden Reduction & Benefits:** Utilizing unrealistic environmental conditions can create unnecessary burdens whenever (1) environmental conditions are modified due to plant design or analysis revisions (e.g., steam generator replacement, adoption of new accident analysis codes), (2) licensees must institute unnecessary measures to maintain conditions within existing qualification limits or requalify equipment to more severe conditions (e.g., efforts in response to IN 89-10), and (3) the unrealistic conditions are barriers to the qualification of modern, innovative equipment designs that could be effectively utilized to increase overall equipment performance and plant safety. The environmental conditions should not be based on the DEGB of the largest system pipes. More realistic criteria should be utilized to establish DEGB break sizes based on fracture mechanics and risk significance considerations. Examples of analytical assumptions that could be modified to provide more realistic modeling of accident conditions include (1) more realistic assumptions regarding steam generator moisture carryover during MSLB conditions, (2) recognition of moisture revaporization on equipment surfaces and its ability to inhibit equipment temperatures that exceed saturation temperature, (3) the use of test results which demonstrate lower heat transfer coefficients than those defined in NUREG-0588 when performing component thermal analysis.

**Recommended Resolution Path:** Issue an RIS (or similar generic communication) clarifying the NRC position regarding acceptable methods for establishing environmental conditions for equipment qualification purposes. Solicit technical information from the industry and others regarding available data and recommended methods.

## **6. Permit Use of Realistic Methods to Define Accident Environment Radiation Conditions**

**Discussion:** Licensees are currently required to LOCA-qualify equipment using either the TID-14844 source term or an Alternate Source Term (AST) under 10 CFR 100.11. Under both methods, the source term assumes a significantly degraded core and release of “appreciable” quantities of fission products and does not represent the source term associated with LOCA mitigation based on DBA criteria and assumptions (e.g., 10 CFR 50 Appendix K and licensee FSAR Chapter 15 LOCA analysis). Consequently, equipment designed to mitigate a LOCA is required to be qualified to radiation levels that would only occur if such equipment failed to properly function (i.e., an unmitigated LOCA or severe accident). More realistic radiation conditions should apply to equipment required for LOCA mitigation. The more severe radiation conditions (e.g., TID-14844) could be applied to that subset of 50.49 equipment deemed important to severe accident mitigation.

**Regulatory Basis:**

10 CFR 50.49  
Regulatory Guide 1.89, Rev. 1  
NUREG-0588  
DOR Guidelines

**Burden Reduction & Benefits:** The use of unrealistic DBA LOCA radiation conditions for qualification purposes creates a barrier to the use of modern, innovative equipment designs that could be effectively utilized to increase overall equipment performance and plant safety. These high dose values have inhibited the use of materials that may be operationally superior with respect to other conditions and performance requirements. Further, accuracy data during accident qualification tests has been found to be closely coupled to accumulated dose for electronic instruments. Since this data is integral to uncertainty analysis and setpoint calculations, the resulting technical specification setpoint values can be unnecessarily restrictive and limit a plant’s operating envelope. Finally, unnecessary licensee resources are expended establishing and re-evaluating equipment qualification whenever new information or plant analyses bring into question the basis for the equipment’s qualification for these integrated radiation conditions.

**Recommended Resolution Path:** Issue an RIS (or similar generic communication) clarifying the NRC position regarding the use of source terms that are more representative of the DBA LOCA core damage level predicted using 10 CFR 50 Appendix K assumptions.

## **7. Permit Flexibility when Establishing EQ-Required Maintenance, Surveillance, & Replacement Intervals**

**Discussion:** Licensees often interpret NRC requirements as precluding flexibility when establishing maintenance actions based on qualified life calculations or vendor EQ

requirements. Given the uncertainty and subjective nature of these bases, licensees should possess the flexibility to identify and adjust maintenance schedules for 50.49 equipment, including the establishment of “grace periods” using other factors, including risk significance and the maintenance rule and associated guidance regarding maintenance planning and managing risk. Similarly, even where such “grace periods” have not been pre-established, licensees should be able to address operability from a Generic Letter 91-18 standpoint, taking into account risk considerations for EQ equipment.

***Regulatory Basis:***

10 CFR 50.49  
Regulatory Guide 1.89, Rev. 1  
NUREG-0588  
DOR Guidelines

***Burden Reduction & Benefits:*** By providing licensees with operational flexibility when conducting qualification-required maintenance, replacement, and testing actions, plant operation and safety would be improved by minimizing unnecessarily placing safety-related equipment out of service during power operation to complete these activities.

***Recommended Resolution Path:*** Issue an RIS (or similar generic communication) clarifying the NRC position regarding flexibility when scheduling qualification-driven maintenance and replacement actions.

## **8. Clarify Guidance-Only Status of Regulatory Guide 1.97**

***Discussion:*** Some NRC staff have incorrectly concluded that the footnote reference in 10 CFR 50.49 to Regulatory Guide 1.97 Rev. 2 codifies the qualification provisions of the regulatory guide. This incorrect interpretation has limited licensee flexibility when seeking to take exception to the guidance in Regulatory Guide 1.97 concerning qualification.

***Regulatory Basis:***

10 CFR 50.49

***Burden Reduction & Benefits:*** Licensees should establish, with NRC concurrence, qualification requirements for accident monitoring instruments based on careful evaluation of operating procedures, accident analyses, risk assessments, and emergency preparedness needs. This has been the intent of Regulatory Guide 1.97 revisions. 10 CFR 50.49 should not be misinterpreted, as codifying the qualification requirements of Regulatory Guide 1.97 Rev. 2.

***Recommended Resolution Path:*** Issue an RIS (or similar generic communication) clarifying the NRC position regarding the 10 CFR 50.49 footnote reference to Regulatory Guide 1.97 Rev. 2.

## **9. Reaffirm 10CFR50.49 Regarding Equipment Scope**

**Discussion:** Some NRC staff have incorrectly concluded that equipment exposed to challenging environmental conditions during normal operation, including anticipated operational occurrences, and similar conditions during accidents must be qualified in accordance with 10 CFR 50.49. For example, an item located near BWR main steam lines may be exposed to a high integrated radiation dose during normal operation that may exceed the dose during accident conditions. 10 CFR 50.49 specifically excludes such equipment from its scope if the accident conditions are not significantly more severe from those occurring during normal operation, including anticipated operational occurrences. Assurance of operability for such equipment is provided by appropriate design and procurement requirements coupled with maintenance/surveillance and performance monitoring programs (See SRP 3.11). Incorrectly requiring implementation of the provisions and qualification methods of 50.49 for such equipment unnecessarily burdens licensees by applying these strict controls in unnecessary applications.

**Regulatory Basis:**  
10 CFR 50.49

**Burden Reduction & Benefits:** Licensees' equipment qualification program resources are diluted whenever equipment is unnecessarily placed within the scope of 10 CFR 50.49. This resource dilution is ongoing since licensees must continue to install, operate, maintain, and replace such equipment in accordance with their EQ program requirements.

**Recommended Resolution Path:** Issue an RIS (or similar generic communication) clarifying the NRC position regarding the inclusion of such equipment within the scope of 10 CFR 50.49.

## **10. Permit the Use of Low Risk Significance as a 'Sound Reason to the Contrary'**

**Discussion:** For equipment determined by risk-based considerations to be of relatively low safety significance, licensees should be permitted to utilize equipment qualified to the provisions of the DOR Guidelines or NUREG 0588 Category II. 10 CFR 50.49(l) requires replacement equipment to be qualified in accordance with the EQ rule's provisions unless there are "sound reasons to the contrary". Regulatory Guide 1.98 Rev. 2 §C.6 provides example sound reasons considered acceptable to the NRC staff. Typically, there has been a reluctant to consider other sound reasons. As determined by the NRC during the EQ Task Action Plan, the qualification provisions of these guidance documents are adequate for both the current and renewal terms. Consequently, adequate assurance of performance and safety during accident conditions will continue to be maintained if these provisions were applied to replacement equipment with relatively low safety significance.

NUGEQ Comments on Reducing Unnecessary Regulatory Burden  
July 2, 2001

***Regulatory Basis:***

10 CFR 50.49

Regulatory Guide 1.89, Rev. 1

***Burden Reduction & Benefits:*** Typically, licensees must institute plant design changes whenever replacement equipment is “upgraded” in accordance with §50.49(l). As part of these significant design change efforts, licensees must evaluate available qualified equipment and design, specify, procure, and installed this new equipment. The design change process entails significant costs and resources involving necessary changes to numerous documents. These include qualification program and design modification documents and a litany of configuration control-related documents including maintenance/operation procedures, procurement/ parts data, and vendor manuals. This potentially extensive effort provides little, if any, safety improvement for equipment with relatively low safety significance. For this equipment safety significance is an adequate basis to continue use of the DOR Guidelines or NUREG-0588 Category II as the qualification bases.

***Recommended Resolution Path:*** Issue an RIS (or similar generic communication) clarifying the NRC position regarding the use of risk significance as a “sound reason to the contrary”.

Each of the items 1-9 above have been included in the NEI matrix of burden reduction actions. Item 10 was subsequently added to the NUGEQ comments. It should also be considered part of the overall list of burden reduction actions.